STACK 5
SOCIAL SCIENCES

INDUSTRIAL MEDICINE

The Journal of Occupational Diseases and Traumatic Surgery

June, 1942

Emergency Medical Service
—For Catastrophies—

The Substandard Worker
—Physical Examination and Placement—

Processing Techniques
—In Physical Examinations—

Women in Industry
—Placement and Health Maintenance—

Industrial Hygiene Problems
—In War Industries—

Job Placement at Lockheed-Vega
—The Humm-Wadsworth Temperament Scale—

Maintenance of Health
—In the Management Group—

Sickness Absenteeism
—Present and Future—

Medical Decisions
—In Employee Relations—

Hernial Repair
—Injection Treatment versus Open Operation—

Tuberculosis in Industry
—Management of the Employee—

OFFICE FOR EMERGENCY MANAGEMENT
LIBRARY

Volume 11 Number 6

QUICK RECOVERY IN BURNS

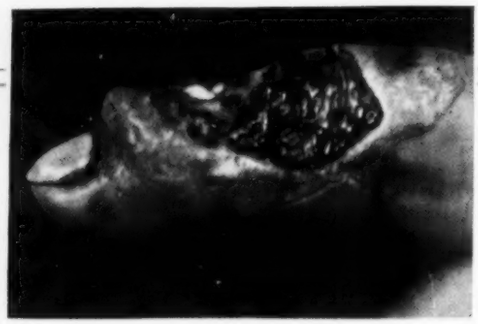


Figure 1: Lateral view of deep burn of left forefinger caused by 11,000 volt shock. The appearance of the lesion at 3 weeks is demonstrated, showing the deep destructive process typical of severe electrical burns. The extensor tendon has sloughed out, the distal interphalangeal joint has been fully exposed and amputation appears necessary.

Figure 2: Appearance of injured finger 4½ weeks after Figure 1. Treatment during intervening period consisted of dressings — changed infrequently — with White's Vitamin A and D Ointment, and the use of a finger splint. In response to this therapy, sloughing quickly cleared up and granulations filled in the extensive defect over exposed bones. Complete healing, as shown, was accomplished without complicating infection 4½ weeks after Figure 1, and 7½ weeks after the injury.

The industrial worker's time is important to himself, to his employer and to the nation.

Burns that incapacitate an individual for a long time are therefore working a three-fold hardship.

To hasten the healing of burned areas and to be sure that the healing, once accomplished, is satisfactory, make liberal use of

White's

VITAMIN A & D OINTMENT

This clinically-tested therapeutic agent encourages rapid, healthy granulation and epithelial repair, avoiding the contractures of coagulant therapy.

Other indications include varicose and other trophic ulcers, avulsive and crushing injuries and miscellaneous surface wounds in which primary surgical union is impossible or inadvisable.

WHITE'S VITAMIN A & D OINTMENT

contains Vitamin A and D, derived from fish liver oils, in a suitable excipient. It is a pharmaceutically elegant compound, possessing a lasting pleasing odor—remains stable and does not develop rancidity.

Supplied in four convenient sizes: 1.5 oz. tubes, 8 oz. and 16 oz. jars, 5 lb. containers.

Our Medical Director will be glad to receive your inquiry concerning any phase of the use of this product. Write White Laboratories, Inc., 113 N. 13th Street, Newark, N. J.

Today's necessity for reducing lost man-hours and increasing employee well-being emphasizes again the importance of suitable vitamin regimens for many industrial workers. White Laboratories occupies an enviable position in the Vitamin field.

Our extensive line of Vitamin Preparations makes possible a procedure suited to individual needs. We invite consultation on the possibilities of such a program.

OFFICE FOR EMERGENCY MANAGEMENT
LIBRARY

THE "*LONG PULL*" IN ARTHRITIS

Overnight relief isn't the solution to the arthritis problem.

Despite the fact that the most prominent symptoms of chronic arthritis are confined to the joints, the disease is systemic.

Treatment must also be systemic, and must be continued over a long period.

Best results with ERTRON are obtained only when therapy is continued over an appreciable period of time.

When patients are maintained on a full Ertronization dosage, the vast majority will obtain marked benefit if treatment is continued.

ERTRON*
in ARTHRITIS

New Low Prices { Bottles of 100 . . . . . $8.00
Bottles of 50 . . . . . 4.50

ERTRON is made only in the distinctive two-color gelatin capsule.

ERTRON is high potency, activated, vaporized sterol (Whittier Process).

Products of Nutrition Research Laboratories are promoted only through the medical profession

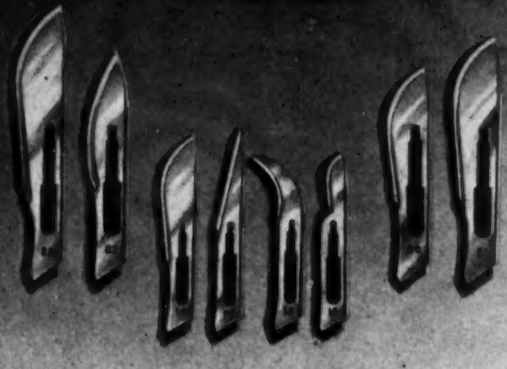
* Reg. U. S. Pat. Off.

NUTRITION RESEARCH LABORATORIES
4210 Peterson Avenue, Chicago, Illinois

Dependability

. . . at your finger tips

RIB-BACK BLADES



Exclusive **B-P HANDLE** advantages

DISTAL ENDS . . .
redesigned for use in blunt dissection

ELONGATED HANDLES . . .
for deep surgery

The purchase of economical, superior quality Rib-Back Blades is as close to the hospital buyer's finger tips as his telephone. The recognized dependability of these widely preferred surgical blades assumes a measure of even greater significance during this existing period of emergency.

Rib-Back quality counts today. Their uniformly superior sharpness, adequate degree of rigidity, greater strength, not only satisfy the discriminating surgeon's demands . . . they definitely tend to maintain blade consumption at a practical minimum. Longer cutting efficiency and a negligible percentage of discards contribute towards closer budget control.

Ask your dealer

BARD-PARKER COMPANY, INC.
DANBURY CONNECTICUT

B-P
A BARD-PARKER PRODUCT

MEDICINE SURGERY

OCCUPATIONAL DISEASES
TRAUMATIC, INDUSTRIAL

INDUSTRIAL MEDICINE
& RAILROAD SURGERY

Industrial Medicine | Volume II | JUNE, 1942 | Number 6 | Industrial Medicine

OFFICE FOR EMERGENCY MANAGEMENT
LIBRARY

This Month

WAR PRODUCTION Problems.....*B. D. Kunkle* 245
—Developments and Responsibilities

EMERGENCY Medical Service.....*J. S. Lambie, M.D.* 248
—For Catastrophies

RESEARCHES in Industrial Hygiene.....*L. B. Case* 250
—Outline of Recent Developments

PROCESSING Techniques.....*Fred B. Wishard, M.D.* 253
—In Physical Examination

INDUSTRIAL HYGIENE Problems.....*J. J. Bloomfield* 256
—War Industries

JOB PLACEMENT at Lockheed-Vega.....*F. E. Poole, M.D.* 260
—The Humm-Wadsworth Temperament Scale

MAINTENANCE of Health.....*Martin I. Hall, M.D.* 263
—In the Management Group

X-RAY Protection.....*M. B. Evans, Jr.* 265
—Safety for the Working Personnel

TUBERCULOSIS in Industry.....*George A. Sherman, M.D.* 267
—Management of the Employee

EXPERIENCES with 4 x 5 Films.....*G. E. Gundersen, M.D.* 270
—Economy, Ease, Rapidity

SICKNESS Absenteeism.....*A. T. Court* 271
—Present and Future

MEDICAL Decisions.....*H. W. Anderson* 275
—And Employee Relations

THE TREATMENT of Burns.....*Grover C. Penberthy, M.D.* 277
—Management of the Burned Patient

HERNIAL Repair.....*Howard Barker, M.D.* 280
—Injection Treatment versus Open Operation

WOMEN in Industry.....*Max R. Burnell, M.D.* 282
—Placement and Health Maintenance

THE SUBSTANDARD Worker.....*P. J. Ochsner, M.D.* 283
—Physical Examination and Placement

AMERICAN ASSOCIATION of Industrial Physicians and Surgeons:
PRESIDENT'S ADDRESS.....*T. Lyle Hazlett, M.D.* 285

EDITORIAL 287

THE METABOLISM of Fluoride.....*Willard Machle* 288
(With *E. W. Scott* and *E. J. Largent*)

INDUSTRIAL HEALTH and DISEASE:
MILK in National Health.....*E. B. Hart* 290
INDUSTRIAL Health.....*C. O. Sappington, M.D., Dr. P.H.* 292
—As Related to Licensure

IN THE Production of War Materials, Every Man-Hour Counts." That was the theme of the 1942 General Motors Medical Conference, April 24-25, at Pontiac, Michigan, from which are the 16 presentations in the following pages (245-285). Once before, in August, 1938, we printed almost as many G. M. Conference papers in a single issue—14, to be exact. We mention it as the basis for repeating, with reaffirmed and double emphasis concerning the 16 now, what we said about the 14 then: "They comprise an array of subjects, an authority of treatment, and a value in application which it is a privilege to publish and an education to read. And they carry their respective importances so well that we refrain from commendation. Their aggregate is an instance which yields explicit meaning to the poet's words: '. . . praise amounts to nearest nothing where it most is earned,' and is as significant to the quality of industrial medical literature as the matters and things with which the papers deal are significant to the quality of industrial medical science". . . . DR. HAZLETT reports on his stewardship as chief executive of the A.A.I.P. & S. (page 285) during the year preceding the convention at Cincinnati in April. AND DR. SAPPINGTON'S "Industrial Health as Related to Licensure" (page 292) confirms the fact that the industrial medicine which is now working so well in practice has proved, thereby, its right to be taught in preparation.

INDUSTRIAL MEDICINE, The Journal of Occupational Diseases and Traumatic Surgery. Entered as second class mail matter August 28, 1941, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879. Published on the fifth of each month by INDUSTRIAL MEDICINE PUBLISHING COMPANY, Chicago. STEPHEN G. HALOS, President; A. D. CLOUD, Publisher; C. O. SAPPINGTON, M.D., DR. P.H., Editor; E. P. LOOK, Secretary; CHARLES DRUECK, JR., Treasurer; STEPHEN G. HALOS, Advertising and Business Manager. PUBLICATION, EDITORIAL and EXECUTIVE Offices: 540 No. Michigan Ave., Chicago, Illinois. Subscription $5.00 per year in the United States; $5.50 per year in Canada; $6.00 per year in other countries. Single copies 50 cents. Title Registered in U. S. Pat. Off.

Copyright, 1942, by Industrial Medicine Publishing Company, Chicago.

INDUSTRIAL MEDICAL and RAILWAY SURGICAL ASSOCIATIONS

Officers; Directors; Committees; Meetings

Industrial Medicine
Reg U. S. Pat. Off.

Official Publication

American Association of Industrial Physicians and Surgeons

THE object of this Association shall be to foster the study and discussion of the problems peculiar to the practice of industrial medicine and surgery; to develop methods adapted to the conservation of health among workers in the industries; to promote a more general understanding of the purposes and results of the medical care of employees, and to unite into one organization members of the medical profession specializing in industrial medicine and surgery for their mutual advancement in the practice of their profession.

Officers

President
JOHN J. WITTMER, M.D.
Consolidated Edison Company of New York, New York, N. Y.

President-Elect
HARVEY BARTLE, M.D.
Pennsylvania Railroad, Philadelphia, Pennsylvania

First Vice-President
FREDERICK W. SLOBE, M.D.
Automatic Electric Company, Chicago, Illinois

Second Vice-President
MELVIN N. NEWQUIST, M.D.
The Texas Company, New York, N. Y.

Treasurer
EDWARD C. HOLMBLAD, M.D.
Railway Express Agency, 28 East Jackson Boulevard, Chicago, Illinois

Managing Director
EDWARD C. HOLMBLAD, M.D.

Convention Manager
ARMOUR G. PARK
28 East Jackson Boulevard, Chicago, Illinois

Directors 1941-1943

DANIEL L. LYNCH, M.D.
New England Telephone & Telegraph Company, Boston, Massachusetts

WILLIAM A. SAWYER, M.D.
Eastman Kodak Company, Rochester, New York

LOYAL A. SHOUDY, M.D.
Bethlehem Steel Company, Bethlehem, Pennsylvania

CLARENCE D. SELBY, M.D.
General Motors Corporation, Detroit, Michigan

RICHARD E. NEWBERRY, M.D.
President, Georgia Association of Industrial Physicians and Surgeons, Atlanta, Georgia

FRANK T. MCCORMICK, M.D.
Detroit Industries, Detroit, Michigan

Directors 1942-1944

T. LYLE HAZLETT, M.D.
Westinghouse Electric & Mfg. Co., Pittsburgh, Pennsylvania

CAREY P. MCCORD, M.D.
Industrial Health Conservancy Laboratories, Detroit, Michigan

HAROLD A. VONACHEN, M.D.
Caterpillar Tractor Company, Peoria, Illinois

ADVERTISERS

Alkalol Company, The 290
Alkalol

Aloe, A. S., Company 14
Major Plaster Bandage

American Optical Company 17
Eye Protection

Bard-Parker Company, Inc. 2
Rib-Back Blades

Becton, Dickinson & Co. 18
Ace Adhesive-Elastic Bandages

Carbisulphoil Company ..... 3rd Cover
Foille

Ciba Pharmaceutical Products .... 4th Cover
Nupercainal

Crescent Surgical Sales Co., Inc. 289
Surgical Blades and Handles

Effervescent Products, Inc. 288
Clinitest

Hynson, Westcott & Dunning, Inc. 291
Mercurochrome

Leeming, Thos. & Co., Inc. 12
Calmitol

Lepel High Frequency Laboratories, Inc. .. 292
Short Wave Diathermies

Lientz, E. C., & Co., Inc. 7
Hydrosulphosol

Merck & Co., Inc. 4
Ichthyol

Morton Salt Co. 286
Morton Salt Tablets

Norwich Pharmacal Co. 15
Unguentine

Nutrition Research Laboratories 1, 22
Ertron; Bezon

Packwood, G. H., Mfg. Co. 6
Pax

Patch, The E. L., Company 292
Gadoment

Patterson Screen Co., The 10
X-Ray Screens

Pelton & Crane Co., The 16
Pelton Localite

Powers X-Ray Service 20
Rapid Chest X-Ray

Reynolds, R. J., Tobacco Company 11
Camel Cigarettes

Rigidtest Products, Inc. 293
Rigidtest Surgical Dressing

Searle, G. D., & Co. 5
Furmerane

Sharp & Dohme 9
'Lyovac' Normal Human Plasma

Walker Vitamin Products, Inc. 289
Dexaline Salt Tablets

Wallace & Tiernan Products, Inc. 21
Azochloramid

West Disinfecting Company 19
Lan-O-Kleen

White Laboratories ..... 2nd Cover
Vitamin A and D Ointment

Wilmot Castle Company 13
Sterilizing Equipment and Lights

Wyeth, John, & Brother, Inc. 291
Wyanoids

Industrial Medicine
Reg U. S. Pat. Off.

Official Publication

American Association of Industrial Physicians and Surgeons

ROBERT A. KEHOE, M.D.
Director, Kettering Laboratory of Applied Physiology, Cincinnati, Ohio

RICHARD P. BELL, M.D.
Cleveland Diesel Engine Division, General Motors Corporation, Cleveland, Ohio

F. E. POOLE, M.D.
Lockheed Aircraft Corporation, Vega Aircraft Corporation, Burbank, California

Committees

National Defense
DANIEL L. LYNCH, M.D., Chairman
HENRY S. BROWN, M.D.
D. O. HAMBLIN, M.D.
CHARLES-FRANCIS LONG, M.D.

Component Societies
A. H. WHITTAKER, M.D., Chairman
RICHARD E. NEWBERRY, M.D.
RALPH CHRISTOPHER LEGGO, M.D.
WILLIS W. LASHER, M.D.
JAMES A. SIMPSON, M.D.
DON W. DEAL, M.D.

Membership
B. L. VOSBURGH, M.D., Chairman
E. A. IRVIN, M.D.
FRANK T. McCORMICK, M.D.

Publication and Editorial Policy
C. O. SAPPINGTON, M.D., Chairman
ROBERT A. KEHOE, M.D.
CLARENCE D. SELBY, M.D.

Nutrition
W. A. SAWYER, M.D., Chairman
HALSTEAD S. MURAT, M.D.
A. G. KAMMER, M.D.
H. H. FELLOWS, M.D.
FRANK PEDLEY, M.D.
F. G. BARR, M.D.

Psychiatry
LOYAL A. SHOUDY, M.D., Chairman
LYDIA G. GIBERSON, M.D.
CASSIUS H. WATSON, M.D.

Fatigue
J. M. CARLISLE, M. D., Chairman
M. H. HEILMAN, M.D.
MACK SHAFER, M.D.

Medical Records and Procedures
STUART F. MEEK, M.D., Chairman
CAREY P. McCORD, M.D.
B. L. VOSBURGH, M.D.
MELVIN N. NEWQUIST, M.D.

Medical Education
M. H. KRONENBERG, M.D., Chairman
F. J. WAMPLER, M.D.
SARAH I. MORRIS, M.D.

Prevention of Blindness
JOHN J. WITTMER, M.D., Chairman
N. E. ECKELBERRY, M.D.
HARRY SPAULDING, M.D.

Syphilis
CASSIUS H. WATSON, M.D., Chairman
HARVEY BARTLE, M.D.
HAROLD A. VONACHEN, M.D.

Certification
EDW. C. HOLMBLAD, M.D., Chairman
VOLNEY S. CHENEY, M.D.
FREDERICK W. SLOBE, M.D.

Finance
VOLNEY S. CHENEY, M.D., Chairman
EDWARD C. HOLMBLAD, M.D.
FREDERICK W. SLOBE, M.D.

Auditing
FRED. W. SLOBE, M.D., Chairman
HENRY S. BROWN, M.D.
ELSTON L. BELKNAP, M.D.

ICHTHYOL
COUNCIL ACCEPTED AMERICAL MEDICAL ASSN. ACCEPTED
Prescribed for more than 50 years because of its mildly local antiseptic, astringent, and emollient properties. "Ichthyol" is the registered trade mark of the product supplied under the Merck label and originally introduced by Unna. Literature on request.
MERCK & CO. INC. *Manufacturing Chemists* RAHWAY, N. J.

Treating a wound in the Middle Ages, by application of the actual cautery.

A Hot Iron Will Destroy Bacteria

BUT YOU WOULDN'T USE IT CLINICALLY

There are many antiseptics which will destroy bacteria, but they also destroy the surrounding tissue, leaving it vulnerable to further infection.

With Furmerane in suitable dilutions, you have at your command an agent with an unusually high degree of tissue-safety; yet, it is powerfully germicidal against a wide variety of organisms.

FURMERANE

(2-HYDROXY-MERCURI FURAN)

Powerful and Safe Germicide for General Use

Laboratory and clinical studies on a large scale have demonstrated the bactericidal and bacteriostatic potency of Furmerane, its penetrative ability, its efficacy for pre-surgical skin preparation and for general germicidal use, as well as its remarkably low tissue-toxicity in effective dilutions.

Furmerane Solution ..... 1:3000—4-oz., pints and gallons
Furmerane Tincture ..... 1:400 —4-oz., pints and gallons
Furmerane Ointment ..... 1:3000—¾-oz. tubes and 1-lb. jars
Furmerane Nasal Drops with Ephedrine ..... 1-oz., 4-oz., pints and gallons

G·D·SEARLE & CO·

Ethical Pharmaceuticals Since 1888

CHICAGO · New York · Kansas City · San Francisco

SEARLE

Association for the Advancement of Industrial Medicine and Surgery Inc.

PURPOSE: To disseminate accurate medical knowledge in reference to the diagnosis and treatment of all conditions arising out of and in the course of employment.

Officers

IRVING GRAY, M.D., President
25 Plaza Street, Brooklyn, N. Y.
HENRY C. JOHNSON, M.D., Vice-President
90 John Street, New York
ROBERT G. WOOLSEY, M.D.,
Recording Secretary
151 Clinton Street, Brooklyn, N. Y.
JOSEPH L. RAMIREZ, M.D., Treasurer
30 Fifth Avenue, New York
JOHN J. BLACKFORD, Executive Secretary
370 Lexington Avenue, New York
(Caledonia 5-9750)

Executive Council

Term Expires 1943
FRED H. ALBEE, M.D., New York
WILLIS W. LASHER, M.D.,
Employers Liability Assurance Co.
JOHN J. WITTMER, M.D.,
Consolidated Edison Co.

Term expires 1944
F. WALLIS DAVIS, M.D., Borden Company
FREDERICK L. MOSSER
Third Avenue Ry. & Bus Lines
HARRY V. SPAULDING, M.D., New York

Term Expires 1945
HACLYON HALSTED, M.D.,
Pelham Manor, New York
ANTHONY AVATA, M.D.,
Hartford Accident & Indemnity Co.
J. W. HARRIS, M.D.,
Aetna Insurance Co.

Committee Chairmen

Public Relations Committee
WILLIS W. LASHER, M.D.
630 Fifth Avenue, N. Y.
Scientific Committee
RUSSELL G. KIMBALL, M.D.
4 Irving Place, N. Y.
Legislative Committee
O. A. BRENENSTUHL, M.D.
345 Hamilton Street, Albany, N. Y.
Membership Committee
JULIUS BRANDWEIN, M.D.
446 West 34th Street, N. Y.
Welfare Committee
SAMUEL FEUER, M.D.
304 Marcy Avenue, Brooklyn, N. Y.
Honorary Membership Committee
H. H. RITTER, M.D.
755 Park Avenue, N. Y.
Delegates to Convention of American Association of Industrial Physicians and Surgeons:
JOHN J. WITTMER, M.D.
WILLIS W. LASHER, M.D.
LEONARD GREENBERG, M.D.
Nominating Committee
EDWARD E. KAPLAN, M.D.
JULIUS BRANDWEIN, M.D.
N. A. RINI, M.D.
Industrial Health Committee
LEONARD GREENBERG
80 Center Street, N. Y.

Annual Dinner October 29, 1942
Annual Meeting December 18, 1942

Component Society of the American Association of Industrial Physicians and Surgeons.

Central States Society of Industrial Medicine and Surgery

Officers 1941-1942

URBAN E. GEBHARD, M.D., Milwaukee
President
C. O. SAPPINGTON, M.D., Dr.P.H., Chicago
President-Elect
EMERY B. NEFF, M.D., Moline, Illinois
Vice-President
FRANK P. HAMMOND, M.D., Chicago
Secretary-Treasurer

Board of Governors

Term to Expire, 1942.
DR. WILLIAM C. GOENNE, Davenport, Ia.
DR. JAMES A. JACKSON, Madison, Wis.
DR. JOHN J. GRANT, Freeport, Ill.

Term to Expire 1943.
DR. HAROLD A. VONACHEN, Peoria, Ill.
DR. HERMAN W. WELLMERLING,
Blomington, Ill.
DR. MELVIN L. HOLE, Danville, Ill.

Term to Expire 1944.
DR. JAMES A. VALENTINE, Chicago
DR. DONALD C. CONZETT, Dubuque, Iowa
DR. ROLAND A. JACOBSON, Chicago

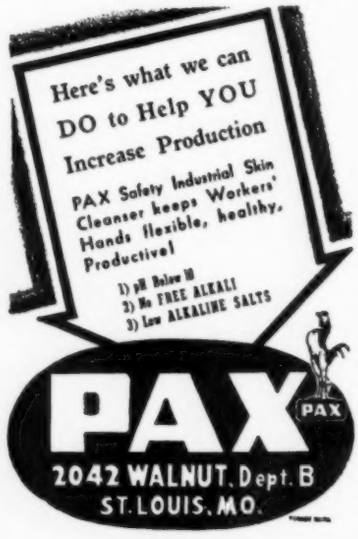
Component Society of the American Association of Industrial Physicians and Surgeons.

GENERAL

DR. W. A. SAWYER, of Eastman Kodak Company, Rochester, Chairman of the A.A. I.P. & S. Committee on Nutrition, recently sent all Association members a questionnaire on nutrition. It is DR. SAWYER'S wish that attention be given to this questionnaire, and that it be answered and returned to him. He advises that if any physician who received the questionnaire is not now in a position to answer it, or does not directly serve industry, the Committee will appreciate his returning the questionnaire, indicating that such is the case.

DR. ROBERT M. GRAHAM has been appointed Director of the Department of Sanitation and Surgery of the Pullman Company, succeeding DR. THOMAS R. CROWDER, deceased. DR. GRAHAM was born in Iowa; graduated, B.S., University of Iowa, 1917; M.D., State University of Iowa College of Medicine, 1920. After hospital service in Iowa City, New York City and Chicago, and army service in World War I, he established a general practice at Oshkosh, Wisconsin. Later he was Hospital Visitor for the American College of Surgeons. In October, 1922, he became affiliated with the Pullman Company where he has since been Chief Medical Examiner, until May 1, the date of his new appointment.

CHICAGO CHAPTER, American Red Cross, has formed a First Aid Medical Advisory Committee, to function in advising the Chapter regarding the development and expansion of the first aid program commensurate with the needs and the possibilities of the territory within its jurisdiction. It is believed the committee can be particularly valuable in maintaining satisfactory relationships between the Chapter and the members of the local medical pro-



New York State Society of Industrial Medicine

1941-1942 Officers

O. A. BRENENSTUHL, M.D.
President
RAYMOND C. ALMY, M.D.
First Vice-President and Treasurer
P. K. MENZIES, M.D.
Second Vice-President
FRANK E. REDMOND
Executive Secretary

Directors

DR. RAYMOND C. ALMY, Auburn
Columbia Rope Co.
DR. H. H. BAKER, Rochester
423 Granite Bldg.
DR. O. A. BRENENSTUHL
345 Hamilton St., Albany
DR. PHILIP L. FORSTER, Albany
367 State St.
DR. CHAS. D. SQUIRES, Binghamton
28 Conklin Ave.
DR. WILLIS C. TEMPLER, Corning
Corning Glass Works
DR. FRANCIS J. RYAN, Syracuse
New York State Railways
DR. B. J. SLATER, Rochester
Eastman Kodak Company
DR. L. W. LOCKE, Utica
288 Genessee St.
DR. A. M. DICKINSON, Albany
New York Central R. R.
DR. M. S. BLOOM, Binghamton
Dunn & McCarthy
DR. E. MacD. STANTON, Schenectady
American Locomotive Company
DR. F. N. C. JERAULD, Niagara Falls
723 Erie Ave.
DR. DONALD C. O'CONNOR, Buffalo
International Railways
American Radiator Co.
DR. RICHARD S. FARR, Syracuse
Consulting Orthopedist
DR. C. W. WOODALL, Schenectady
146 Barrett St.
DR. JOHN L. NORRIS, Rochester
Eastman Kodak Company, Kodak Park.
DR. PAUL B. JENKINS, Binghamton
141 Main St.
DR. E. A. VANDER VEER, Albany
28 Eagle St.
DR. OTTMAR W. FREY, Oneida
Oneida Ltd.
DR. HAROLD C. LYMAN, Utica
250 Genessee St.
DR. P. K. MENZIES, Syracuse
511 Medical Arts Bldg.
DR. FRED C. SABIN, Little Falls
23 W. Ann. St.
DR. REEVE M. BROWN, Buffalo
Chevrolet-Motor and Axle
Div. of General Motors

The Industrial Doctor

Official Section of the New York State Society of Industrial Medicine. Now combined with INDUSTRIAL MEDICINE.

Published under supervision of the Ways and Means Committee of the New York State Society of Industrial Medicine. Editorial office, F. E. REDMOND, Managing Editor, 361 Delaware Avenue, Buffalo, N. Y. Articles herein do not necessarily reflect the opinion or policy of this journal nor of the New York State Society of Industrial Medicine.

Editorial Board

B. J. SLATER, M.D. M. S. BLOOM, M.D.
REEVE M. BROWN, M.D.
FRED C. SABIN, M.D.
L. W. LOCKE, M.D.
RAYMOND C. ALMY, M.D.
PAUL B. JENKINS, M.D.
WILLIS C. TEMPLER, M.D.
P. L. FORSTER, M.D.
A. M. DICKINSON, M.D.
CHAS. D. SQUIRES, M.D.
RICHARD S. FARR, M.D.
OTTMAR W. FREY, M.D.
HAROLD C. LYMAN, M.D.
P. K. MENZIES, M.D.
C. W. WOODALL, M.D.
FRANCIS J. RYAN, M.D.
D. C. O'CONNOR, M.D.
F. N. C. JERAULD, M.D.
E. MacD. STANTON, M.D.
E. A. VANDER VEER, M.D.
H. H. BAKER, M.D.
O. A. BRENENSTUHL, M.D.
JOHN L. NORRIS, M.D.
FRANK E. REDMOND, Managing Editor
361 Delaware Ave., Buffalo, New York

HYDROSULPHOSOL

Industry's New Weapon Against Burn Injuries

★

METHOD OF APPLICATION

"In the cases reported here the Hydrosulphosol was applied as a spray with best results being obtained by diluting the solution on the basis of one part Hydrosulphosol to one part of slightly warm, sterile distilled water. The solution is then sprayed on all burned areas with an ordinary hard-rubber bulb syringe avoiding use of syringes with metal parts.

"Consultation with other doctors using the Hydrosulphosol therapy indicates general acceptance of spray applications as the method of choice in serious burn injuries or old cases. There appears to be some variation of time intervals employed between applications. These spray applications have been made as often as every 15 minutes for the first six hours and then tapered off.

"A satisfactory eschar can be established quickly and the maintenance of a thin, pliable eschar can be controlled by tapering off of spray applications as healing progresses. There is evidence of an ability to favorably influence healing processes by continuing application of the spray treatment until recovery is complete. The eschar established by the Hydrosulphosol spray separates without surgical aid in from seven to ten days.

"In treating burns in the eyes 4 cc. Hydrosulphosol to one fluid ounce of sterile distilled water was used as drops. This same strength solution was used in wet compresses over the eyes when indicated."*

*"*The Treatment of Face and Eye Burns with a Sulfhydryl Solution,"* INDUSTRIAL MEDICINE, *Vol. II, No. 3, Mar., 1942.*

SUGGESTED VARIATIONS—In old cases or after debridement it may be found advisable to use a 1:2 or 1:3 dilution until tolerance is established.

In treating eye burns, dilutions used vary up to 1:20 in warm, sterile distilled water.

Reprints on Request

E. C. LIENTZ AND CO. INC.

1006 WEST SIXTH STREET ★ LOS ANGELES, CALIFORNIA

American Association of Railway Surgeons

Officers, 1941-1942

J. L. CROOK, M.D., Jackson, Tenn.
President
HAROLD A. SPILMAN, M.D., Ottumwa, Ia.
Vice President
A. J. O'BRIEN, M.D., Ironwood, Mich.
Vice President
JOHN J. BRANDABUR, M.D., Huntington, W. Va., Vice President
T. L. HANSEN, M.D., Chicago, Ill.
Treasurer
R. B. KEPNER, M.D., Chicago, Ill.
Secretary

Executive Board

A. R. METZ, M.D., Chicago, Ill., Chairman
JOHN R. NILSSON, M.D., Omaha, Neb.
W. J. LANCASTER, M.D., Wilmington, N. C.
D. B. MOSS, M.D., Palmyra, Mo.
IRVING S. CUTTER, M.D., Chicago, Ill.
HARVEY BARTLE, M.D., Philadelphia, Pa.

Association of Surgeons of the New York Central System

Officers

B. L. COLEY, M.D., F.A.C.S.
President
N. W. GILLETTE, M.D.
Vice-President
G. H. MARCY, M.D. Vice-President
H. M. LONG, M.D. Vice-President
H. A. FATHAUER
Secretary-Treasurer

Office of Secretary-Treasurer.
413 LaSalle Steet Station,
Chicago. Telephone WABash 4200

Executive Council

B. L. COLEY, M.D., F.A.C.S.
Chief Surgeon, New York City
L. A. ENSMINGER, M.D., F.A.C.S.
Chief Surgeon, Indianapolis
H. A. FATHAUER
Secretary-Treasurer
GEORGE P. MYERS, M.D., F.A.C.S.
Medical Director, Detroit
F. E. PIERCE, M.D., F.A.C.S.
Chief Surgeon, Chicago
HERBERT M. LONG, M.D.
Chief Surgeon, Pittsburgh
OLIVER G. BROWNE
General Claims Attorney

Association of Railway and Industrial Physicians and Surgeons of Kansas City

J. E. CASTLES, M.D., President
F. A. FEIERABEND, M.D., Vice-President
RALPH MYERS, M.D., Secretary
CARL N. LINDQUIST, M.D., Treasurer
Kansas City, Missouri

Component Society of the American Association of Industrial Physicians and Surgeons.

Georgia Association of Industrial Surgeons

BENJAMIN H. MINCHEW, M.D., Waycross
President
J. W. SIMMONS, M.D., Brunswick
Vice-President
C. F. HOLTON, M.D., Savannah
Secretary-Treasurer

Component Society of the American Association of Industrial Physicians and Surgeons.

Maryland Association of Industrial Physicians and Surgeons

DR. HERBERT C. BLAKE, President
Medical Arts Building, Baltimore, Md.
DR. HAROLD BOHLMAN, Vice-President
Medical Arts Building, Baltimore, Md.
DR. ROBERT F. CHENOWITH
1127 St. Paul St., Baltimore, Md.
Secretary-Treasurer

Component Society of the American Association of Industrial Physicians and Surgeons.

Institute of Traumatic Surgery

Officers

PAUL B. MAGNUSON, President
JAMES J. CALLAHAN Vice-President
ROLAND A. JACOBSON
Secretary and Treasurer

Board of Governors

KELLOGG SPEED ARTHUR H. CONLEY
J. B. WILLEMS ERIC OLDBERG

fession, especially through the various medical organizations. The following were named: DR. HART E. FISHER, Chairman; DR. HARRY MOCK; DR. VOLNEY CHENEY; DR. PHILLIP KREUSCHER; DR. BOWMAN CROWELL; DR. MALCOLM T. MAC EACHERN; DR. C. O. SAPPINGTON; DR. M. H. KRONENBERG; DR. JAMES P. SIMONDS; DR. H. PRATHER SAUNDERS; DR. HUGH N. MAC KENZIE; DR. J. H. CHIVERS; DR. SAMUEL J. McNEILL; DR. DAVID MONASH; DR. HAROLD F. MACHLAN; DR. PAUL TESCHNER; DR. FRED W. HALL; COL. A. D. TUTTLE, and DR. EDWIN W. RYERSON.

DR. JOSEPH SHILEN, Pittsburgh, has been appointed head of the Division of Industrial Hygiene of the State Department of Health, Harrisburg. He succeeds DR. WILLIAM B. FULTON, who was appointed Chief of the Division of Health, U. S. Bureau of Mines. DR. SHILEN graduated at George Washington University School of Medicine, Washington, D. C., in 1916.

DR. M. H. KRONENBERG, Chief, Division of Industrial Hygiene, Illinois Department of Health, was among the participants in a round-table discussion on health services in time of war at a conference of the Illinois Welfare Association, central district, at Peoria, May 19, 1942. Round-table theme: "The health of the war worker and his family is as important as that of the soldier."

DR. K. E. MARKUSON, Director, Bureau of Industrial Hygiene, Michigan Health Department, was the speaker at the first of a series of lectures for industrial nurses, at the Bryant Paper Company auditorium, Kalamazoo, May 18. PAUL RESIN, Field Supervisor of the Bureau of Industrial Hygiene gave the second lecture, May 25, on "Industrial Dusts, Vapors, Fumes, Mists, and Gases."

JOANNA M. JOHNSON, R.N., Supervisor of Industrial Nursing, Employers Mutuals, Milwaukee, and Editor of INDUSTRIAL NURSING, presided at the Industrial Nursing Round Table of the Industrial Nursing Section, N.O.P.H.N., (12th biennial convention, 18th meeting) Chicago, May 18, 1942. ELEANOR W. MUMFORD, R.N., Associate for Nursing Activities, National Society for the Prevention of Blindness, New York, spoke on "Eye Problems of the Nurse in Industry." RISPAH PORTER, R.N., First Aid Department, Chain Belt Company, Milwaukee, spoke on "Health and Safety of the Employee from the Nurse's Viewpoint."

DR. STARLING D. STEINER, Baltimore, has been appointed Chief of the newly organized Division of Industrial Health of the Maryland State Department of Health. He was detailed to the state department by the U. S. Public Health Service in July, 1941, for advisory services on occu-

Milwaukee Association of Industrial Physicians and Traumatic Surgeons

Officers

DR. U. E. GEBHARD, President,
1332 So. 16th St., Milwaukee
DR. GEORGE HOFFMAN, Vice-President,
7006 W. Greenfield, Milwaukee
DR. O. A. SANDER, Secretary-Treasurer
710 W. Plankinton Ave., Milwaukee

Board of Directors

DR. H. G. OAKLAND,
1651 N. 12th St., Milwaukee
DR. S. H. WETZLER,
606 W. Wisconsin Ave., Milwaukee
DR. EDWARD QUICK,
411 E. Mason St., Milwaukee
DR. DAVID MEHIGAN,
231 W. Wisconsin Ave., Milwaukee

Component Society of the American Association of Industrial Physicians and Surgeons.

New Jersey Association of Industrial Physicians and Surgeons

Officers

DONALD O. HAMBLIN, M.D., President
American Cyanamid Co.,
30 Rockefeller Plaza, New York City.
E. E. EVANS, M.D., Vice-President
E. I. DuPont deNemours,
Dye Works Hospital, Deepwater, N. J.
H. IRVING DUNN, M.D., Treasurer
Merck & Co.,
Rahway, N. J.
R. G. BIRRELL, M.D., Secretary
Standard Oil Co. of New Jersey,
Bayway Refinery, Linden, N. J.

Directors

J. M. CARLISLE, M.D.
Merck & Co., Rahway, N. J.
WM. H. McCALLION, M.D.
General Aniline Co.,
722 Westminster Ave., Elizabeth, N. J.
CHESTER T. BROWN, M.D.
Prudential Insurance Co.
Newark, N. J.

Component Society of the American Association of Industrial Physicians and Surgeons.

Michigan Association of Industrial Physicians and Surgeons

Officers

HENRY COOK, M.D., Flint
President
CLARENCE D. SELBY, M.D., Detroit
President-Elect
LEON SEVEY, M.D., Grand Rapids
Vice-President
I. DUANE MILLER, M.D., Grand Rapids
Secretary-Treasurer

Board of Directors

R. H. DENHAM, M.D., Grand Rapids
EARL I. CARR, M.D., Lansing
FRANK T. McCORMICK, M.D., Detroit

Component Society of the American Association of Industrial Physicians and Surgeons.

Chicago Society of Industrial Medicine and Surgery

1941-1942 Officers

THOMAS C. BROWNING, M.D., Chicago
President
FELIX JANSEY, M.D., Chicago
Vice-President
FRANK P. HAMMOND, M.D., Chicago
Secretary-Treasurer

Board of Governors

Terms to Expire 1942:
FRED G. CARLS, M.D., Chicago
CLARENCE W. HENNAN, M.D., Chicago
JOSEPH H. THOMAS, M.D., Chicago
Terms to Expire 1943:
EMILE C. DUVAL, M.D., Chicago
FRED M. MILLER, M.D., Chicago
CHARLES DRUECK, M.D., Chicago
Terms to Expire 1944:
ROLAND A. JACOBSON, M.D., Chicago
O. W. REST, M.D., Chicago
FREDERICK W. SLOBE, M.D., Chicago

PEACE-TIME THINKING *IS* OUT!

TODAY, no reasonable person can risk the assumption that existing conditions and facilities will remain unaltered. We must be prepared to deal with emergencies. This is particularly true in the field of medicine, when the ability to meet adequately an emergency may mean the difference between life and death.

Stable, portable 'Lyovac' Normal Human Plasma *is* always ready for emergency, and can be stored wherever transfusion of plasma may be required—*in operating room, delivery room, or accident room, and in offices, ambulances, first-aid stations and mobile disaster units.*

Each 250-cc. unit of 'Lyovac' Normal Human Plasma provides approximately as much osmotically active protein as 500 cc. of whole blood. Stability is assured by means of quick freezing, followed by desiccation and storage under vacuum. "Dried plasma is one of the safest approved transfusion mediums now available on a mass-production basis. It does not require refrigeration and may be kept indefinitely."[1] Restoration is simple and rapid, and hypertonic (concentrated) plasma can be easily prepared when required.

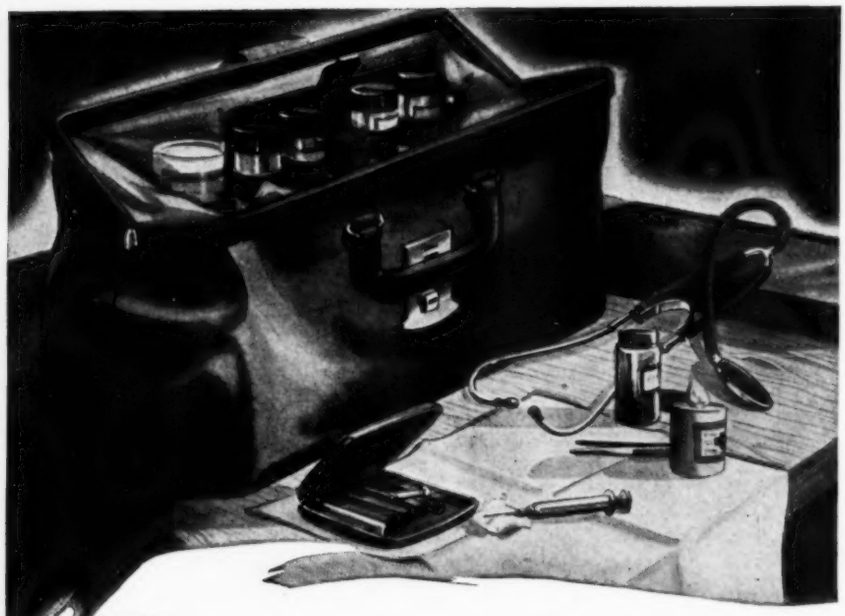
Each 250-cc. unit of restored 'Lyovac' Normal Human Plasma

1. Provides essentially unchanged the proteins, antibodies, complementary and coagulating substances, together with three-fifths of the platelets present in the 250 cc. of fresh human blood plasma from which it was prepared.
2. May be administered at once without typing and cross-matching.
3. Decreases rather than increases hemoconcentration.

1. Medical Preparedness: J. A. M. A., 117:1711, Nov. 15, 1941

'Lyovac' NORMAL HUMAN PLASMA

SHARP & DOHME, *Philadelphia*



Vital tools of defense!

Yes, every family physician, every nurse, every member of America's Health Army has a vital role in National Defense. For the Arsenal of Democracy's strength lies in the ability of its civilian population to produce—to stay on the job under the stress of "all out" production.

The magnitude of this task is apparent from official estimates that behind every man in the armed forces today are eighteen others on the home front keeping him supplied with the materials of defense.

Now more than ever, there can be no compromise with health. Only the best is good enough. The medical profession's arsenal must be kept filled with the highest quality equipment and supplies.

Speaking for ourselves, we can assure you that Patterson's facilities are keyed to the demands of the war program. Through increased vigilance over raw materials, improved production facilities and constant research, Patterson Fluoroscopic and Intensifying Screens will continue to give the unexcelled performance expected of them—under every conceivable operating condition.

PATTERSON'S facilities devoted 100% to Public Health and Defense of the Democracies

THE PATTERSON SCREEN CO. TOWANDA, PA., U. S. A.

Patterson X-Ray Screens

pational diseases and other health hazards in defense and other industries in the state. Official organization of the division was completed January 1. Preliminary services effected last year will be expanded and developed under his direction, with particular reference to the defense industries.

DR. ARTHUR H. RUGGLES, of Providence, Rhode Island, president-elect, American Psychiatric Association, at the annual meeting, Boston, May 18, challenged the general belief that the 50-hour week will cause nervous breakdowns. "For the past 30 years," he said, "I have been looking for a case of a mental breakdown caused by overwork or overstudy, and I have yet to find one." He explained that many cases are seen where the mental or nervous breakdown is due to combining hard work with too much alcohol, too little sleep, insufficient diet, unwholesome working conditions, and especially worry about work. "So far as I know," he declared, "there is no scientific evidence to show that a 40-hour week is better for mental health than a 50-hour week. Yet, for the past decade we have heard almost nothing about the dignity and value of a long week's work." He predicted that, owing to medical advances, the 30% of disabilities in our armed forces in World War I from nervous and mental troubles can be cut in this war to 15 or 20%.

Western Association of Industrial Physicians and Surgeons

Officers

R. T. LEGGE, M.D., F.A.C.S., President
Professor of Hygiene, University of California, Berkeley, California.

CHRISTOPHER LEGGO, M.D., Secretary
Plant Physician, California and Hawaiian Sugar Refining Corp., Ltd., Crockett, California.

J. M. McCULLOUGH, M.D., Treasurer
Plant Physician, American Smelting & Refining Company, Selby Plant, Union Oil Company, Oleum Plant, Crockett, California.

Directors

C. A. WALKER, M.D., F.A.C.S.
Chief Surgeon, Southern Pacific Company Pacific Lines, Southern Pacific Hospital, San Francisco, California.

JOHN P. RUSSELL, M.D.
Industrial Hygiene Service State of California, Berkeley.

LOUIS D. CHENEY, M.D.
Plant Physician, Goodyear Rubber Company, Los Angeles, California.

BENJ. FREES, M.D., F.A.C.S.
Chief Surgeon, Armour and Company, Firestone Tire & Rubber Co., 947 W. 8th Street, Los Angeles, California.

Executive Secretary,
ELIZABETH CAFFREY, R.N., P.H.N.
California and Hawaiian Sugar Refining Corp., Ltd., Crockett, California.

Component Society of the American Association of Industrial Physicians and Surgeons.

Hawaiian Society of Industrial Physicians and Surgeons

DR. THOMAS KEAY, Pepeekeo, Hawaii
President

DR. W. N. BERGIN, Laupahoehoe, Hawaii
Vice-President

DR. H. M. PATTERSON, Olaa, Hawaii
Secretary-Treasurer

Component Society of the American Association of Industrial Physicians and Surgeons.

Florida Association of Industrial Surgeons

Officers

A. M. BIDWELL, M.D., President
FREDERICK OETJEN, M.D., President-Elect
KENNETH MORRIS, M.D., Vice-President
T. H. ROBERTS, M.D., Secretary-Treasurer
P. O. Box 425, Lakeland, Florida.

Directors

J. W. ALSOBROOK, M.D.
F. W. GLENN, M.D.
FRANK D. GRAY, M.D.
HARRISON A. WALKER, M.D.

Component Society of the American Association of Industrial Physicians and Surgeons.

New England Conference of Industrial Physicians

Officers

DR. J. NEWTON SHIRLEY, Director
Arrow Mutual Liability Insurance Co., Chestnut Hill, Massachusetts.

DR. THOMAS L. SHIPMAN, Assist. Director
Medical Director, General Electric Co., West Lynn, Massachusetts.

DR. J. ALLAN THOMPSON,
Secretary-Treasurer
900 Massachusetts Ave.,
Cambridge, Massachusetts

Board of Directors

DR. HALSTEAD G. MURRAY
Dennison Manufacturing Company, Framingham, Massachusetts.

DR. EUGENE F. McCARTY
Rumford, Maine (Oxford Paper Co.).

DR. DANIEL L. LYNCH
New England Telephone & Telegraph Co., Boston, Massachusetts.

Component Society of the American Association of Industrial Physicians and Surgeons.

Camel invites you

TO ENJOY THE INTERESTING FEATURES
OF THE CAMEL CIGARETTE EXHIBIT AT THE

A. M. A. CONVENTION — JUNE 8 TO 12

RESPIRATORY ABSORPTION OF NICOTINE FROM CIGARETTE SMOKE
The photo-mural at the right shows the areas of absorption of nicotine from cigarette smoke, according to late scientific-medical references
25%
13%
50%
ATLANTIC CITY JUNE 8-12-41
AMA
COME TO OUR EXHIBIT

- See for the first time the dramatic visualization of nicotine absorption from cigarette smoke in the human respiratory tract—
- See the giant photo-murals of Camel laboratory research experiments in the burning rate and nicotine production in the smoke of the 5 largest-selling brands of cigarettes—
- Keep up to the minute on international news with the Camel Cigarette *Trans-Lux* "flash" bulletins, while you enjoy a supply of slow-burning Camel Cigarettes—
- The smoke of slow-burning CAMELS contained less nicotine than that of the 4 other largest-selling brands tested—less than any of them—according to independent scientific tests of the smoke itself!

  In the same tests, CAMEL burned slower than any of the 4 other largest-selling brands tested.

● **SEND FOR REPRINT** of an important contribution to medical literature—"The Cigarette, The Soldier, and The Physician," The Military Surgeon, July, 1941—revealing many new angles about smoking. Write Camel Cigarettes, Medical Relations Division, 1 Pershing Square, New York City.

Camel

THE CIGARETTE OF COSTLIER TOBACCOS

and the TREK TO THE GREAT OUTDOORS

Increased exposure to plant and other irritants, and skin conditions intensified by heat and perspiration give Calmitol Ointment added importance during the summer season.

The intense itching of allergic food reactions, of ivy and oak poisoning and other contact dermatites, need only be short-lived. Calmitol Ointment acts promptly and allays the discomfort of pruritus for prolonged periods. Scratching is obviated and secondary traumatic lesions are prevented. Calmitol provides symptomatic relief also in urticaria, ringworm, eczema, and pruritus vulvae, scroti and ani.

Calmitol contains chlor-iodocamphoric aldehyde, levo-hyoscine oleinate, and menthol, incorporated in an alcohol-chloroform-ether vehicle. Pruritus is controlled through its blocking action upon cutaneous receptor organs and nerve endings. Calmitol is protective, bacteriostatic, and induces mild active hyperemia.

Thos. Leeming & Co. Inc.
101 West 31st Street, New York

CALMITOL LIQUID and OINTMENT
THE DEPENDABLE ANTI-PRURITIC

DR. SHERMAN S. PINTO, until recently associated with the Massachusetts State Division of Occupational Hygiene, Boston, has been named Supervisor of Industrial Hygiene of the State Department of Health, New Orleans. DR. PINTO graduated at the University of Nebraska College of Medicine, Omaha, in 1932.

DR. O. L. MILLER, of Charlotte, North Carolina, addressed the mining and quarry section of the North Carolina Industrial Safety Conference, May 17, on "Fractures of the Bones of the Foot." At the foundry and machine shop section meeting, DR. C. M. BERRY, of Raleigh, talked on "Occupational Health Hazards Associated with Welding," and DR. JAMES W. DAVIS, of Statesville, gave an illustrated lecture on "Hand Injuries."

ELLA MAE HOTT, Director, Division of Public Health Nursing of Missouri, on a radio program devoted to industrial hygiene, (WHB, Kansas City, Missouri, May 9) was asked if she felt the place of the nurse will be important in accomplishing the broad aims of industrial hygiene. She replied: "I feel that the place of the nurse is and will become increasingly important as time goes on. I say increasingly important because the nurse has already established herself in industry as an important ally of industrial health. There are now over 200 industrial nurses employed in Missouri alone, some of whom have served the same employees for 20 years. The continued growth of interest in industrial nursing and the fact that young nurses are turning to the field today is a tribute to these pioneers who have demonstrated the value of their

American Industrial Hygiene Association

Officers 1942-1943

PROFESSOR PHILIP DRINKER, President
Division of Industrial Hygiene, Harvard School of Public Health, 55 Shattuck Street, Boston.

H. H. SCHRENK, Ph.D., President-Elect
U. S. Bureau of Mines, 4800 Forbes Street, Pittsburgh, Pennsylvania.

DONALD E. CUMMINGS, Past President
Director, Division of Industrial Hygiene, Department of Medicine, University of Colorado School of Medicine and Hospitals, Denver.

EDGAR C. BARNES, Secretary
Industrial Hygiene Laboratory, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania.

THEODORE F. HATCH, Treasurer
Associate Professor of Industrial Hygiene, University of Pennsylvania Medical School, Philadelphia.

Directors

J. J. BLOOMFIELD
Sanitary Engineer, National Institute of Health, U. S. Public Health Service, Bethesda, Maryland.

MANFRED BOWDITH
Director, Division of Industrial Hygiene, Massachusetts Department of Labor and Industries, 23 Joy Street, Boston.

WARREN A. COOK
Division of Industrial Hygiene and Engineering Research, Zurich General Accident & Liability Insurance Company, Chicago.

KARL L. DUNN
Industrial Hygienist, Corning Glass Works, Corning, New York.

J. WILLIAM FEHNEL
Division of Industrial Hygiene, Metropolitan Life Insurance Company, 1 Madison Avenue, New York.

GORDON C. HARROLD, Ph.D.
Industrial Hygiene Laboratories, Chrysler Corporation, 341 Massachusetts Avenue, Detroit, Michigan.

DON D. IRISH, Ph.D.
Biochemical Laboratory, Dow Chemical Company, Midland, Michigan.

ROBERT A. KEHOE, M.D.
Director, Kettering Laboratory of Applied Physiology, College of Medicine, University of Cincinnati, Eden Avenue, Cincinnati, Ohio.

C. W. MUEHLBERGER, Ph.D.
State Toxicologist, Michigan Department of Health, Lansing.

REUEL C. STRATTON
Supervising Chemical Engineer, Engineering and Inspection Division, The Travelers, Hartford, Connecticut.

American Conference on Industrial Health

Officers

VOLNEY S. CHENEY, M.D., President
EDWARD C. HOLMBLAD, M.D.
First Vice-President
FREDERICK W. SLOBE, M.D.
Second Vice-President
HAROLD A. VONACHEN, M.D., Treasurer
JAMES A. VALENTINE, M.D., Secretary
C. O. SAPPINGTON, M.D., Dr. P. H.
Executive Director
ARMOUR G. PARK, Executive Secretary
28 E. Jackson Boul., Chicago.

TO provide an organization, not for pecuniary profit, in which all agencies and societies, both medical and lay, concerned with the problems of industrial health can hold membership and can meet together in conference for the study, discussion and careful consideration of all industrial health problems and procedure; to engage in scientific research to determine the cause, nature, prevention and cure of diseases and injuries of occupations; to assist in establishing and supervising industrial health clincs to serve small industries; to establish and maintain hospitals which will furnish facilities for the care, treatment and study of occupational injuries and diseases; to make surveys of industrial medical services and recommendations for their improvement; to solicit, receive and administer funds for any purpose that will advance and/or improve industrial health; to establish undergraduate and/or post-graduate courses in industrial medicine and surgery and/or to cooperate with medical schools and industries in maintaining such courses; and to use all those means, which from time to time, may seem wise, for the advancement of industrial health.

Will your Hospital Equipment

and First Aid Services

★ Keep Production Rolling? ★

ARE YOUR STERILIZERS UP-TO-DATE? HAVE THEY AMPLE CAPACITY FOR TODAY'S JOB? ARE THEY EFFICIENT? COMPLETELY SAFE? HOW ABOUT OPERATING LIGHTS? A REALLY GOOD LIGHT SPEEDS THE DOCTOR'S WORK.

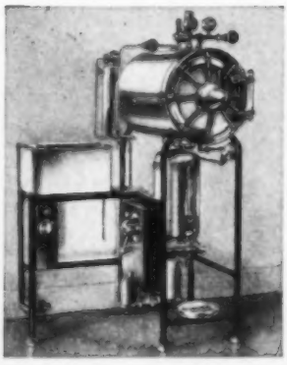
CASUALTIES on the production line today can be as costly as casualties in the field.

The responsibility of preventing any production let-down is in your hands. With plant personnel doubled or tripled, your present equipment may not be adequate for the job. Under any conditions, the chances are that you have a definite need for Castle Industrial Sterilizing Equipment and for Castle Lights.

Wire us the approximate number of cases handled daily by your First Aid Department. Let us recommend adequate equipment. We can make good deliveries on high priority orders.

CASTLE 669 ***(Illustrated above with water sterilizer)***

Has 8″ x 16″ autoclave with CAST-IN-BRONZE construction. Entire body, ends and base cast in one piece of lifetime bronze. Recessed 16″ CAST-IN-BRONZE Instrument Sterilizer with silent oil-check foot lift. 9″ x 20″ black porcelain finished table top. Spacious double cabinet with plate glass doors and shelves. "Full-Automatic" throughout.



Castle Sterilizers range in size from the smallest portable electric 16″ boiler to a battery for a city hospital. Standardized unit for various size plants are available.

CASTLE 1150

Combines 16″ x 20″ Pressure Dressing and Utensil Sterilizer, 3 gal. Pressure Water Sterilizer, 3 qt. Water Still, and 17″ Instrument Sterilizer with foot pedal lift. Affords full hospital sterilization in one compact, efficient unit.

CASTLE LIGHTS

Castle No.1 Spotlight provides ample, cool, color-corrected, glareless, shadow-free light wherever it is needed most. Although operator's head may be held directly in front of light, a complete spot of illumination will still be projected. Unexcelled for locating foreign bodies in the eye. Completely adjustable, on tripod caster base or wall mounting. Other Castle Lights include Major Operating Lights, Lights for Improved Over-All Illumination and Emergency Power Units.

WILMOT CASTLE COMPANY

1161 University Avenue, Rochester, N. Y.

Throw away your Plaster Shears!

REMOVE MAJOR PLASTER BANDAGES WITH HOT WATER

Enjoy new ease in the bivalving and removal of plaster casts

With the new Major Plaster Bandage there is no need for heavy cutting shears, as this bandage is easily removed with hot water. It is a lighter, stronger bandage, saving time in application, lessening the weight to the wearer. Its removal may be accomplished either by sponging or immersing in hot water and then unwrapping, or by bivalving as illustrated at the right. These bandages will be found particularly valuable to the surgeon in treatment of club foot or anywhere that frequent change of cast is desirable. Major plaster washes off hands and arms readily with hot water — does not clog sinks or drains, and requires no special traps as with insoluble plaster.

COSTS NO MORE!

Size	Dozen	Gross, per Doz.
2" x 3 yds.	$1.75	$1.65
3" x 3 yds.	2.10	2.00
4" x 5 yds.	2.80	2.66
5" x 5 yds.	3.35	3.18
6" x 5 yds.	3.80	3.61

See how easily this MAJOR cast can be removed . . .

Before the Major cast has completely set, it is scored with a knife to a depth of 1/16 inch.

When ready to remove, hot water from a hypodermic syringe is run along the groove, disintegrating the plaster. This leaves only the crinoline, cut with scissors.

This method of bivalving leaves a neater edge, destroying none of the cast. Major casts may also be removed by conventional methods.

A. S. ALOE COMPANY

Industrial Division

1831 OLIVE STREET ST. LOUIS, MISSOURI

services. These nurses in industry have fostered the welfare of the worker during his hours in the plant. They have inspired our public health nurses to further efforts in the communities in which they live. As community health is maintained through public health programs, there will be increased ability of the worker in the community to report for his work daily without loss of time through sickness."

DR. CRIT PHARRIS, Industrial Hygiene Physician, State of Connecticut Department of Health, addressed the Industrial Health Forum, (sponsored jointly by the Manufacturers Association of Connecticut and the State Medical Society) at New Haven, May 7, on the subject, "Meeting the Health Needs of the Individual Plant—Minimum Standards for an Adequate Health Program."

AMONG the speakers at a meeting of the Council of Social Agencies, Jersey City, May 18, 1942, were DR. P. J. FINNEGAN, New Jersey Selective Service System, and DR. A. P. HASKINGS, Hudson County physician. The former had as his subject "The Perfect Man Goes to War." The latter, "The Sick Man Stays Home."

DR. DANIEL L. LYNCH, Medical Director, New England Telephone and Telegraph Company, spoke at the annual meeting of the Massachusetts Medical Society, May 27, on "Industrial Health in National Defense."

LAST YEAR the rising accident toll claimed 101,500 lives, disabled 350,000 persons permanently, and injured 3,750,000 workers. In terms of production, industry last year lost 460,000,000 man-days of work from accidents . . . Many states and communities have reduced accident rates 50% or more by well-planned safety programs. Of the 196,000 industrial plants in this country, about 25,000 have prevention programs which cut such losses considerably under peacetime conditions. It is worth remembering, in that connection, that the toll taken by accidents off the job is even more serious than that taken by accidents at the shop and factory—the exact figures for last year being 280,000,000 man-days lost through off-the-job accidents, as against 180,000,000 lost through accidents which occurred at the place of employment.

—From a Statement by DONALD M. NELSON, April 24.

DR. B. A. PETROV, Chief Surgeon of the Black Sea Fleet, in a news dispatch, is reported as saying that 70% of the wounds in naval battles are wounds of the extremities. The solid plaster cast technic developed by DR. H. WINNETT ORR, of Lincoln, Nebraska, is being employed in treating wounds complicated by fractures "with amazing results." In Soviet field surgery, DR. PETROV continued, a plaster cast is applied directly upon the open wound. The action is rapid and sedative, making for the absolute rest of the wound and fracture and facilitating the removal of the patient. "A man wounded in the foot is able to stand at the end of the first fortnight, and it should be added that this method effects tremendous saving in dressing materials, a factor of no small consideration in wartime." Pointing out that burns of the extremities of the face and body were more frequent in the navy than in the army, DR. PETROV said that, "as a basic means of the treatment of such wounds we have adopted the method of the American physician Batman, which has produced excellent results."

—From *Medical Record*, May, 1942.

A YEAR from now, employees in war industry are expected to number 23,000,000. To point out that the medical profession will have more factory workers to care for than ever before is to state the problem in its simplest aspects. Many of the new workers will be women, older men, persons formerly on relief, handicapped, or inexperienced; in other words, they will bring problems of health and efficiency on a scale industry has not hitherto encountered.

—From *Business Week*, May 23.

The Importance of Prompt First Aid in War Production Plants

Costly delays, due to neglected minor injuries, show up as a serious loss in production efficiency. Much of this loss is avoidable, through prompt and effective First Aid treatment of minor injuries with Unguentine.

THE LESSENING of human anguish is a sufficient reason for first aid work, but there is also the national war effort to be considered.

Every hour of a good workman's time that you can save for efficient productiveness is important. Every such hour gained or lost shows up in the production records.

It is essential that the physician in charge dramatize himself to the men. They must realize the importance of first aid, and come to him quickly, even for the most minor scratches. They must be made to realize that a scratch that becomes infected may cost a finger—a hand, or an arm.

The physician and his assistants should aim also to get the workman back on the job as quickly as possible, by such means as relief from needless pain—avoidance of cumbersome wet dressings—and the use of soothing, antiseptic Unguentine.

Unguentine is recommended for first-aid dressings because it is effectively antiseptic, analgesic and anesthetic in a form adapted to prolonged contact with the injured area.

It fights infection—guards against reinfection and promotes tissue regeneration, so that wounds heal quickly, usually without a scar.

Easily applied and readily removed for re-dressing, Unguentine has been of great usefulness in first aid for many years.

Available in economical pound and five-pound tins, as well as handy tubes and jars from your usual source of supply.

Many physicians choose Unguentine* for minor burns, especially of the face, hands and jointed areas of the body, where scar tissue and its effects must be minimized.

Generations of clinical experience with Unguentine have written an enviable record of prompt healing, usually without a scar.

Unguentine is protective, analgesic, antiphlogistic, antiseptic and germicidal in the treatment of abrasions, lacerations and other denuded areas of the skin, as well as burns.

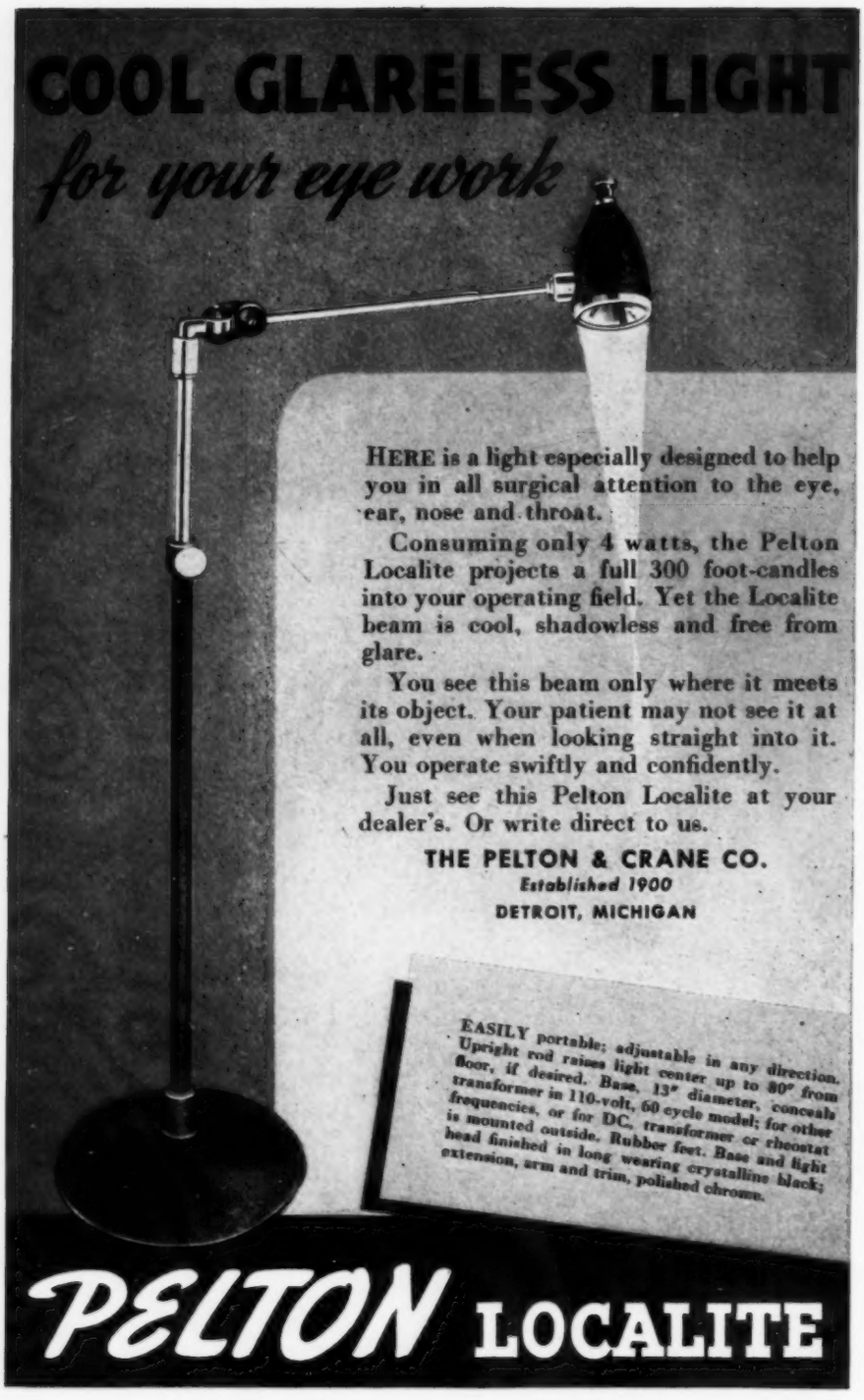
Sample free to physicians on request.

The Norwich Pharmacal Co., 53 Eaton Ave., Norwich, N. Y.

Norwich*

*REG. U. S. PAT. OFF.

UNGUENTINE


COOL GLARELESS LIGHT
for your eye work
HERE is a light especially designed to help you in all surgical attention to the eye, ear, nose and throat.
Consuming only 4 watts, the Pelton Localite projects a full 300 foot-candles into your operating field. Yet the Localite beam is cool, shadowless and free from glare.
You see this beam only where it meets its object. Your patient may not see it at all, even when looking straight into it. You operate swiftly and confidently.
Just see this Pelton Localite at your dealer's. Or write direct to us.
THE PELTON & CRANE CO.
Established 1900
DETROIT, MICHIGAN
EASILY portable; adjustable in any direction. Upright rod raises light center up to 80" from floor, if desired. Base, 13" diameter, conceals transformer in 110-volt, 60 cycle model; for other frequencies, or for DC, transformer or rheostat is mounted outside. Rubber feet. Base and light head finished in long wearing crystalline black; extension, arm and trim, polished chrome.
PELTON LOCALITE

O.D. IN THE MOVIES: Peggy Drake, pulchritudinous young actress, complaining that the scanty clothing she was required to wear in the filming of "The Tuttles of Tahiti" indirectly caused her to catch pneumonia, and that she had to walk around barefooted on a cold set and damp ground, as a result of which she was hospitalized for a considerable time, has brought action against RKO-Radio Pictures, Inc.—according to a newspaper item.

DR. WM. L. COOPER, pathologist, of Los Angeles, reports (press dispatch) that a vitamin-packed fluid extracted from carrots, rubbed into the skin of persons suffering from common colds, may help to reduce costly absences among war industry personnel. His clinical laboratories supervised testing of 150 patients with the new preparation. Other tests, under controlled conditions, are being given to aircraft factory workers and to patients in Eastern cities. "The 150 tested patients had what their physicians diagnosed as colds," DR. COOPER said. "Close to 80% reported themselves cured after the treatment. We believe that many among the remaining 20% were suffering from sinus ailments, influenza, the beginnings of pneumonia, and not from common colds." The fluid is rubbed on a patch of skin approximately 10 inches square on the leg or abdomen. DR. COOPER said it does not prevent colds, and is unable to cure colds, apparently, unless treated within a day or so after they start. The extract is not for sale, but is being made available to a group of physicians for testing.

DR. LOUIS E. BISCH, psychiatrist, author of "Clinical Psychology," "Be Glad You're Neurotic," and other well-known books, in *Click* magazine, July, replies to Lt. Commander Gene Tunney, whose tirade on smoking appeared recently in *Readers Digest*. DR. BISCH says Tunney used statistics and statements from which, by selections and compilations, "almost any conclusion can be found." He continues "I believe in smoking. As a doctor I recommend it. I claim tobacco is one of the greatest boons given to mankind."

ONE present-day factor in absenteeism may lie outside the doctor's province. Despite appeals to patriotism, some workers take time off because their earnings have risen and their opportunities to spend have been restricted. Deprived of such incentives as new cars and new radios, certain individuals prefer their ease on occasion, so long as they are making enough to pay the landlord and the grocer. Plants which are expanding rapidly, thus giving evidence that jobs will be plentiful, have an absenteeism record 90% above the rapidly shrinking plants.

—From *Business Week*, May 23.

DR. A. J. MCGEE, Alcoholic Research Bureau, Keeley Institute, warns against the use of alcohol in first aid. Alcohol is not a heart stimulant; its therapeutic usefulness and value are slight; it is not a cure for any disease; its use in reviving persons suffering from extreme cold or heat is dangerous. "If the first aider, confronted by his first victim, reaches for the brandy flask it is better for him to drink it himself rather than give it to the patient."

ANNUAL PENALTY for sickness is a week's payroll! Reports of the U. S. Public Health Service indicate that American workers average an entire week's absence for illness every year. Other studies show that over *half* of this lost time is due to the common cold and its complications. Absences were reduced in 92% of the firms which established health programs, it is shown in the Industrial Health Practices survey of the National Association of Manufacturers.

—From an advertisement in *Time*, May 18, 1942.

SIMMONS COLLEGE, Boston, is offering a course in Industrial Nursing planned for registered nurses working in industries, and for nurses interested in preparing for such positions. The course takes into consideration industrial organization in relation to health, and attempts to

More Tanks for Yanks

BY PREVENTING EYE ACCIDENTS

Last year, industry lost 9,455,000 man-days through preventable eye accidents. Figuring approximately 900 man-days to produce one light tank—those eye accidents cost the nation the equivalent of 10,000 tanks.

Today, an all-out effort should be made to eliminate eye accidents—to prevent their slowing down vital production. American Optical Company, pioneer manufacturers of eye protection equipment, are prepared to cooperate in every possible way. AO offers a complete line of scientifically designed, comfortable goggles for every type of eye hazard—and the free services of expertly trained Safety Representatives who will give unsparingly of their time and experience to help your Safety Director. *Call in an American Optical Industrial Representative today.*

THE American Optical COMPANY

SOUTHBRIDGE MASSACHUSETTS

733

Elastic adhesive conformance dressings get them back faster....

THE value of occlusive dressings to promote quick healing of wounds in industrial work has long been recognized—but in many instances, it has been difficult or impossible to employ this type of dressing without immobilizing the patient.

Ace Adhesive-Elastic Bandages, however, combine a skin-tested adhesive mass *and* the elasticity of regular Ace Bandages. This makes it possible to apply occlusive, supportive dressings, even directly over joints—without seriously impairing the efficiency of the worker. In this way quick healing may be effected with a minimum loss of working time.

B-D PRODUCTS
Made for the Profession

Available in 2, 2½, 3 and 4-inch widths.

Your regular dealer can supply you.

BECTON, DICKINSON & CO., RUTHERFORD, N. J.

give perspective as to the scope of the industrial nurse's work, with special emphasis on the professional, legal, and educational responsibilities. It will be in charge of MISS KATHRYN FRANKENFIELD, of Philadelphia, where she is supervisor, for the Visiting Nurse Society, of public health nurses working in industrial plants and visiting in the homes of industrial workers. MISS FRANKENFIELD'S classes will be supplemented by lectures in special phases of industrial hygiene. Classes will be held daily except Saturdays during the last three weeks of the summer session—July 20 through August 7, 1942, from 3:00 to 5:00 P.M. Tuition $20.00.

NEW EMPLOYEES experience a sense of elation after having passed the thorough physical examination given each applicant. This includes a chest x-ray, the Wassermann blood test, and urinalysis. Programs for periodic examinations of employees in hazardous occupations have been set up and already started in their cycle. The practice of reporting all minor injuries is showing good results, and a staff of nurses maintains medical care for the employees 24 hours a day and seven days a week. The medical department has also aided in preparing for its part in defense emergencies. Even though extreme care is given every physical examination, the theme is not to eliminate prospective employees, but accurately to determine what work they may be able to do safely. Often gray-haired veterans are marching through the employment procedures to stand in the production line with younger men to whom they lend the knowledge they spent their vigorous years to acquire.

—From "Safety in a Defense Plant," by GLENN M. DAUBACH, in *Westinghouse Safety News*, April, 1942.

TENNESSEE VALLEY AUTHORITY began the drilling of the hard-rock tunnels at three new dams—Nottely, Oconee and Apalachia—concurrently with control of the expected silicosis hazard. DR. JOHN C. SHARP and his staff set up headquarters and made x-ray chest examinations of all prospective tunnel workers, the miners, laborers, engineers, and all employees who would enter the tunnels frequently. Re-examinations were made regularly, and physical changes in respiratory organs noted. The doctors encouraged all to come in for consultation if they had severe colds, lost weight, developed persistent coughs or chest pains, or experienced dizziness, insomnia, digestive disturbances. As workers are hired, the medical staff obtains from each his work history and, when advanced silicosis or tuberculosis is discovered, these men are offered jobs outside the tunnels. "Most of the tunnel workers conscientiously try to protect themselves," says DR. J. T. ELLIS. "But those who get silicosis and are barred from the tunnels rarely accept the outside jobs. They go some place else and get into tunnel work again." U. S. Public Health Service has F. N. CHIRICO, industrial hygienist, at the dam sites to record the amount of silica dust in the tunnel air. The dust count is taken regularly and controls are established. Principal methods have been wet drilling, wetting down the muck pile and providing adequate ventilation. Figures on the extent of control are unavailable, but workers who had silicosis before TVA employment are no worse, and there have been no new cases and no mortalities.

WITH approximately 5,000,000 mothers and potential mothers employed in war work before the end of 1942, three officers of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS (Annual meeting, Cincinnati, April) said that the war is a threat to America's next generation. DR. JOHN J. WITTMER, New York, incoming President; DR. DANIEL L. LYNCH, Boston, Director, and DR. EDWARD C. HOLMBLAD, Chicago, Managing Director, asserted that industrial physicians and surgeons are faced with the biggest problem in the history of their organization. "Mothers in war work constitute a new industrial health problem which must be solved in order to protect the health of tomorrow's babies." Said DR. WITTMER: "Thousands of women are being called into jobs ranging from the making of fuses for shells to the running of huge drill presses and lathes. They are about twice as susceptible to disease as men, and the rate goes up sharply when they marry. We now not only have to think of treating their present illnesses but also the protection of their health for the future." This

News Notes on Sanitation

The Committee on Healthful Working Conditions, National Association of Manufacturers, reports that annually 1% of the workers in the basic industries suffer from dermatitis at an estimated total cost of $200 per case.

Various skin hazards have become evident among workers employed in the production of airplanes. The so-called "dope", a cellulose product dissolved in a solvent and applied to the fabric of the wings, has a defatting action on the skin and can cause dry, chapped hands and chronic fissured eczemas of the hands and arms. A small percentage of workers become sensitized and develop acute eczematoid types of dermatitis of the hands, arms, face and whatever other parts may be exposed to the solvents and their fumes. Protective clothing and ointments, in addition to adequate ventilation, are essential. An article on the subject can be found in the U. S. Public Health report of August 8, 1941.

* * *

In preventing industrial dermatitis, absolute cleanliness is most important—not only after finishing work, but even before *beginning* (as in plants where oils and greases are used which can carry the ordinary bacteria on a worker's hands into litle cuts and abrasions and cause infections). LAN-O-KLEEN, of course, was perfected to keep working hands clean, work-conditioned . . . and *working*.

* * *

Where direct exposure to irritants is unavoidable, the many West Protective Creams have usually proven an effective safe-guard. The West Laboratories are constantly working out new formulae to meet specific cases where special protective creams must be used. The 9 basic creams now manufactured by West, however, are effective for most industrial purposes.

* * *

For preventing dermatitis caused by infections from cutting-oils, Wescol has proven the efficient disinfectant, not only protecting the worker from infection, but, by helping to keep the oil free from harmful bacteria, preventing his reinfection—or the infection of others who use the same cutting-oil.

* * *

One of the many large concerns who have found the various West products efficacious is the Pan-American Airways System, who protect the welfare of both workers and passengers by using different West soaps, disinfectants, etc. Although most of the West products are well known even to the general public, there may be plant sanitation engineers who are not acquainted with some of the special-purpose items manufactured by West. These officers will find our handbook, "The Scope of Sanitation" both interesting and profitable reading. Send for it.

Wash-up strategy helps speed production

LAN-O-KLEEN* offers far-sighted management a real PLUS value in promoting employee good will and fighting dermatitis.

Unlike harsh soaps, LAN-O-KLEEN is an effective hand cleanser which acts TWO ways. First, it gently removes 95% of all soils encountered in industry. Then it **"Work-Conditions"** the hands.

For Lan-O-Kleen is a soap with a corn-meal base, impregnated with pure LANOLIN. Thus Lan-O-Kleen puts back on the hands an oil almost identical to those secreted by the glands in the skin. This helps nature to maintain a normal, healthy skin condition. And healthy hands are less liable to become infected.

THINK IT OVER! Is it worthwhile to improve the condition of working hands—provided your soap cost is no more than it is now? There's a quick way to find out! Clip this coupon to your business letterhead . . . AND TRY LAN-O-KLEEN YOURSELF. You'll find it worthwhile.

For Workers in Contact with Skin Irritants, West Manufactures a Complete Line of SKIN-PROTECTIVE CREAMS

after formulae especially created to meet certain conditions. Our home and branch office staffs will be glad to discuss your needs for a standard or custom-made product of this kind.

*Trade Mark Reg. U. S. Pat. Off.

WEST DISINFECTING COMPANY

SERVING AMERICAN INDUSTRY FOR OVER 50 YEARS

55 BRANCHES Coast-to-Coast and in Canada

CLIP TO YOUR BUSINESS LETTERHEAD, PLEASE

West Disinfecting Company, Dept. IM,
42-16 West Street, Long Island City, N.Y.

Please send me your latest bulletins on

☐ Lan-O-Kleen Hand Cleaner ☐ Wescol ☐ Protective Creams

Name_____ Title_____

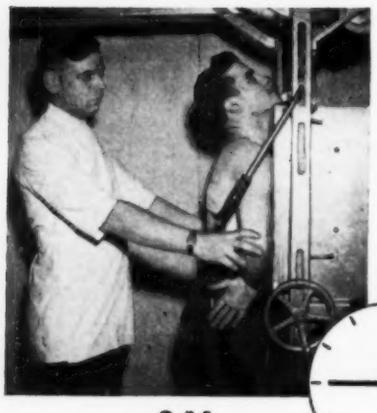
Name of Company_____

Street and Number_____

City and State_____

IF YOU WISH COPIES OF THE COLOR POSTER SHOWN IN THE ABOVE PHOTOGRAPH, USE THE COUPON AND CHECK ☐ HERE

9:10
Subject notified to report for x-ray



9:14
Radiographic exposure is made

9:17
Subject back at work

Avoid Production Losses...

POWERS RAPID CHEST X-RAY SERVICE

A widely endorsed Paper Roll Method for making group radiographic examinations of the thorax which conserves the subject's time.

CONVENIENT

Powerful portable x-ray apparatus is set up on your premises. This equipment is capable of producing from 125 to 150 14" x 17" full size radiographs per hour. Competent attendants supervise the entire radiographic procedure. The Roll Method permits radiographs to be interpreted quickly by your own medical supervisor.

INEXPENSIVE

The amazingly low per-unit cost is predicated upon the total number of subjects to be radiographed within a determinable period of time. No investment in equipment is necessary . . . one price covers the complete Powers Service.

LESS PRODUCTION LOSSES

An employee need be absent from his occupational work only 10 minutes or less in order to have an exposure made. Based upon a personnel of 500 individuals, the total loss of productive time is equivalent to but 84 work-hours of one person . . . a valid consideration during this period of National Emergency.

Write for comprehensive data available on request

POWERS X-RAY SERVICE
GLEN COVE · NEW YORK

problem is complicated by the fact that thousands of married women are trying to carry on two jobs—maintaining a home and working in an industrial plant or Army arsenal, DR. LYNCH observed. "They work eight hours a day, rush home and get dinner, or get breakfast ready if they are on a night shift, and are so keyed up that they cannot sleep. That introduces another problem in this complicated picture of women in industry."

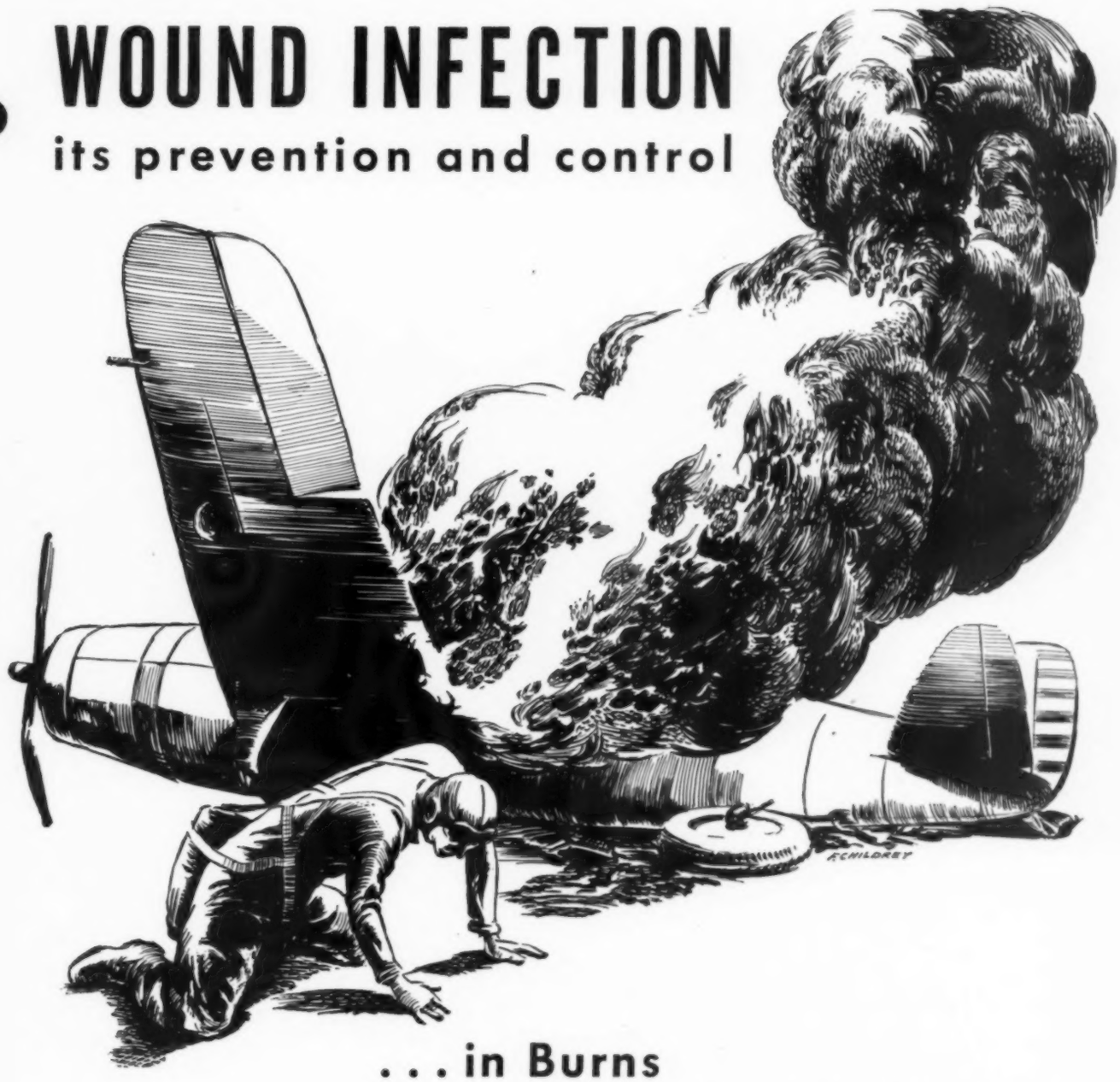
—From General Electric X-ray's *Victor News*, May, 1942.

THE ROCHESTER, New York program in connection with the training of workers for war industries in the vocational schools, combining physical examinations with corrective treatment, is directed by public agencies; the actual record of the examination is not communicated to prospective employers; the end result is that workers with physical impairments are trained for and placed in jobs for which they are suited. Two union representatives are members of the advisory board, as are two representatives of industrial management and the assistant superintendent of the board of education. Said DR. W. A. SAWYER, (Fourth Annual Congress on Industrial Health, January, 1942): "A review of 2,791 records showed that about 33% were disqualified for defense industry employment unless defects were corrected. Of those disqualified, 60% voluntarily sought the Medical Consultant Service of the Tuberculosis and Health Association. Of the 547 men (in the classes with major defects or conditions needing correction, or with disqualifying defects) who saw the consultant, 85% had conditions sufficiently corrected to be given jobs. Of the 110 men found to have definite near vision defects, 84% secured glasses to correct the defects and were approved for employment. It was impossible to make any more than emergency provision for dental repair. All the men found to have cardiovascular disease, diabetes, kidney disease and other chronic diseases were referred to clinics or private physicians, who were requested to give reports of present status to the employment agency. Thirty-three men were referred for surgical treatment of hernia. All having varicose veins were approved for employment after re-examination. The 32 trainees having positive Wassermann tests satisfied health bureau authorities that they would continue under treatment and were subsequently approved for employment, with one exception. Arrangements were made to give smallpox vaccinations to men with no vaccination scar. Nine hundred and twenty-eight (33%) were found to have positive tuberculin skin tests and were referred for chest x-ray examination. Seventeen cases of tuberculosis were discovered, six active. Of the 514 men seen by the medical consultant, 438 were found to be employable, some in selected jobs. In the rehabilitation program, effort was concentrated on the correction of major defects or conditions."

SIR THOMAS OLIVER, long known to readers of INDUSTRIAL MEDICINE as an outstanding authority on industrial diseases, and author of many standard works on the subject, died at Newcastle, England, May 16, at 89. Born in St. Quivox, Ayrshire, he studied at Ayr Academy, Glasgow University, and in Paris, and began his medical practice in Preston, Lancashire, in 1875. He removed to Newcastle in 1879, and from that time was a consulting physician. He was representative of the Home Office at the Madrid International Congress on Hygiene in 1898; was delegate of the Australian Commonwealth International Labor Conference at the League of Nations in 1921; and was honorary president of the International Congress of Accidents and Industrial Diseases at Geneva 10 years later. He was responsible for many revolutionary changes in the social conditions, habits and customs of workers. Nine years ago he stated his theory that work is the cure for illness: "People shouldn't seek the shelter of a do-nothing existence but take an active interest in life."

WOUND INFECTION

its prevention and control



. . . in Burns

Widespread recognition that a burn is a wound and must be treated as such requires that adequate prophylactic treatment be given to prevent infection.

Regardless of the technic favored for the burn under treatment Azochloramid will aid in the prevention of infection or control of frank infection.

ACCEPTED AMERICAN MEDICAL ASSN. Council on Pharmacy and Chemistry

Commenting on the successul application of Azochloramid in his paper "Burns in Children" (J.A.M.A. Vol. 112, pp. 2235-2240) the author says, "We have found Azochloramid to be of considerable value in treating large infected granulating areas. Only one dressing is required daily . . ."

Many other reports attest to the unusual value of Azochloramid in the preparation of burned areas for skin grafts.

Azochloramid N.N'-DICHLOROAZODICARBONAMIDINE MEETS THE CHALLENGE OF INFECTION

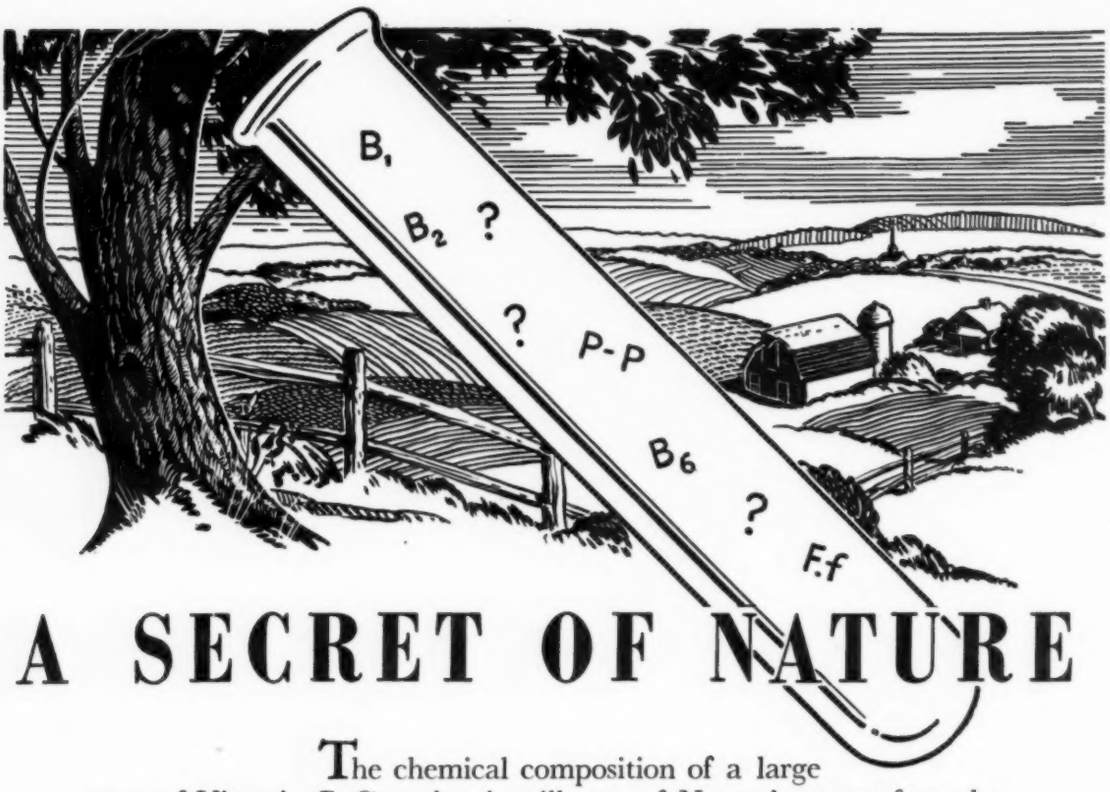
•

Azochloramid is in extensive use by the Army and Navy

Trial quantities and comprehensive literature sent to physicians on request

WALLACE & TIERNAN PRODUCTS, INC.

Belleville, New Jersey, U. S. A.



A SECRET OF NATURE

The chemical composition of a large part of Vitamin B Complex is still one of Nature's secret formulas.

Animal experiments clearly show this, and clinical results demonstrate the need for **WHOLE NATURAL B COMPLEX** in preference to mixtures of synthetic factors.

BEZON

Trade Mark

WHOLE NATURAL B COMPLEX

One capsule of BEZON a day meets the full requirement of thiamin and riboflavin, together with all the other natural B factors.

Now Available: BEZON in bottles of 100 as well as bottles of 30 capsules. BEZON is made only in the distinctive two-color gelatin capsule.

Samples and literature available on request.

The Complete Vitamin Arch **PENDRON**

Reg. U. S. Pat. Off.

Each Pendron capsule furnishes the eight known essential vitamins in amounts which are recognized by the medical profession and governmental agencies as the minimum daily requirement for optimum nutrition. Available in bottles of 30 capsules. Full month's supply.

Products of Nutrition Research Laboratories are promoted only through the medical profession.

NUTRITION RESEARCH LABORATORIES

4210 Peterson Avenue, Chicago, Illinois

This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests, and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

Reg. U. S. Pat. Off.

The editors will exercise care in checking on the accuracy of data printed, but in all other respects articles and opinions of which expression is allowed are the opinions of their authors—the editors reserving in all cases the right to comment on the same, in the current or any subsequent issues, as they may be inclined.

The Journal of Occupational Diseases and Traumatic Surgery

With which are consolidated "The Industrial Doctor" and "International Journal of Medicine and Surgery."

The Science, the Law and the Economics of Industrial Health

Volume 11 June, 1942 Number 6

GENERAL MOTORS MEDICAL CONFERENCE

Pontiac, Michigan **April 24 and 25, 1942**

War Production Problems

B. D. KUNKLE,
Vice-President, General Motors Corporation

IT WAS with considerable hesitation that I accepted the invitation of Dr. Selby to speak to this group tonight on problems with which you are directly concerned, resulting largely from our change-over to war production. Knowing how thoroughly you analyze your health maintenance matters, I feel that there is little I can add to the subjects you have been considering. The only thing I might contribute would be to review the new manufacturing problems from the standpoint of an observer, and it is to this phase of the situation that I will confine my discussion.

When a group of plants such as those which constitute the General Motors organization carry on for a considerable number of years, devoting their manufacturing efforts to what is largely a similar product with certain periodic modifications, a line of experience is developed which fits a particular need, and, while certain readjustments are necessary from time to time because of the introduction of new developments, it is seldom that we are confronted with a drastic change such as is now taking place with our various divisions devoting themselves wholly to the war production effort.

Because of the fact that the General Motors organization has been built largely around engineering and technical development, the products that have been assigned to General Motors in the war effort involve new developments and new techniques. In some of these previous experience is lacking, both inside the corporation and elsewhere. With the exception of divisions such as New Departure, Hyatt, Cleveland Diesel, and few others, the war product is of an entirely different character from that with which the organization has had previous experience. Furthermore, the speed with which it has been necessary to launch our plans for war production and to get actually under way in production itself has not given time for the usual careful analytical study which the various phases of new developments generally receive in the course of our regular productive operations. Consequently, there are two major problems which confront us from the standpoint of health maintenance in our various plants:

First, the wide difference in products and processes, and,

Second, the lack of time experience of the organization itself in dealing with these specific problems.

War Production

GENERALLY speaking, the requirements in war production are widely different from those of our normal commercial production. In addition to satisfactory performance there are many other requirements that enter into the picture where shock resistance and violent action involve the use of materials that are far beyond normal requirements necessary for satisfactory performance in commercial products. These involve materials of much greater toughness and resistance qualities than are usually found in commercial applications. They include gun parts, gun mounts, armored car parts, cast steel and armor plate for tanks, and other similar products. This means the use of alloys much tougher to machine, as well as other materials which involve new hazards in the manufacturing processes. Consequently, in boring and drilling, milling, and other machining operations, the use of new liquid cutting compounds is much more general in the making of the parts. More supervisory care is required, as well as study, to see that in the handling of these compounds all hazards are avoided so far as the employees are concerned, both as to the danger of infection from the material itself, and guarding against contamination in its use. While materials of this kind for the most part are compounded by competent organizations with experience, and while every precaution is exercised and many tests are made, whenever the demand multiplies greatly, as under present conditions, new sources with less experience are brought into the picture. It is important, therefore, that every one of our medical departments keep constantly on the alert for any indication of the development of injurious consequences either from the use of the P. C. compounds, or from the contamination of the compounds in service, to avoid infection or the spread of infection in use.

It also follows that in machining materials with the characteristics indicated, the chips that result are more difficult to handle, and consequently may result in more frequent injury in the handling of the cuttings

This address, prepared by MR. KUNKLE, was read by RALPH L. LEE, of General Motors' Public Relations Staff.

by operators and machine cleaners. Because of the very nature of the materials, cutting tools, such as milling-cutters, drills, reamers, end mills and boring tools, have to be of high cutting ability, and wear resistance, and in operations of this kind there is an increased hazard from breakage and flying particles which may cause injury from flying chips or the breaking of cutting tools in operation. While the protection against this hazard is necessarily a safety matter, nevertheless I look upon the medical departments in our plants as more or less of a guide to the operating divisions, and, inasmuch as injuries of this kind come first to the attention of the *medical departments*, it should be a part of their duties to see that any unusual or recurring injury be brought to the attention of the men in charge of these departmental operations to be sure that proper care is being exercised and adequate protection is given against possible recurrence.

Grinding Operations

IN ADDITION to machining operations, many of the parts have to have a high degree of surface finish, which necessarily means that the number of grinding operations is considerably increased. Since the materials are of a harder or tougher type, grinding wheels must be correspondingly higher in abrasive resistance in order to provide satisfactory wear and surface finish. Here again it is important to see that proper safeguards are used so that the operators may not be unnecessarily exposed to harmful results from such operations.

Heat Treating

HEAT TREATING processes are involved to a much greater extent than in our normal production because most of the materials require hardening or normalizing. This means that again there is an *abnormal* exposure to compounds, as well as increased use of sand-blast and pickling equipment for the removal of scale and for the cleaning of surfaces. The hazard here is not above normal practice, but operations of this kind are now carried on in places where there has been no previous experience in dealing with this type of operations, so that the entire organization has to be brought into quick consciousness of the necessary precautions to be followed in the performing of such operations.

Magnesium

THE special requirements of war production also bring into the picture the use of materials on a rather wide scale which heretofore have not been used to any great extent in our commercial production. This is particularly true of materials such as magnesium. Because of its lightness there in an increasing demand for the use of magnesium where it can serve in a satisfactory way on airplane parts. The manufacturing processes, starting from the foundry to the finished piece, involve entirely new practices in a number of our plants. Magnesium is a material which, when exposed to the air under certain conditions, ignites quickly, and, if the material itself is in such a form as to oxidize quickly, it becomes dangerously explosive. From the time this material is melted in the ladles before pouring it has to be constantly protected with fluxes, and if no foreign substance other than the flux is brought into contact with it, there is no great danger in handling, and its inflammability in this condition seems to be easily controlled. Owing to its very lightness and low specific heat, other elements in foundry practice have to be modified to accommodate its characteristics. Much greater quantities of the material must be used in pouring a given casting, it not being unusual for the casting with gates and risers to be four times the weight of the cast part itself. Great care must be exercised in the preparation of molds and cores so that there is no danger of explosion at this point when pouring. In the cleaning of the casting, because of the fact that the low specific heat does not burn out the core bonds, it is necessary to resort to sand blasting, chipping and hydroblast in order to remove the cores from the pieces. All of these operations necessarily have to be carried on with due precautions. In the cleaning of the castings themselves, it is necessary that the dust which results be kept under constant control, as there is danger of ignition when it is exposed to the air or a limited amount of moisture, so that special precautions and special protection measures have to be installed with the ordinary casting cleaning equipment to guard against this hazard. The material being light and soft, it is not hard to handle or difficult to work, but the danger of combustion, particularly of the dust that results from grinding operations, is probably the most hazardous. In

---

PROGRAM

Monday, Friday, April 24, 1942

DR. E. B. CUDNEY, Chairman:
Words of Welcome—H. J. KLINGLER, Vice-President, General Motors Corporation, General Manager, Pontiac Motor Division.

"Medical Decisions and Employee Relations"—H. W. ANDERSON, Vice-President General Motors (p. 275).

"Industrial Hygiene Problems in the War Industries"—J. J. BLOOMFIELD, Chief, States' Relations Section, Division of Industrial Hygiene, National Institute of Health, Bethesda, Maryland (p. 256).

"Some War Time Experiences in Industrial England"—CAPTAIN C. S. STEPHENSON, (MC) USN, In Charge, Division of Preventive Medicine, Bureau of Medicine and Surgery, Navy Department, Washington, D.C.

Afternoon, Friday, April 24, 1942

DR. J. S. LAMBIE, Chairman:
Welcome—DON R. LARKIN, Resident Manager Fisher Body Division, Pontiac, Michigan.

"Use of Sulphonated Castor Oil in The Prevention of Dermatitis,"—DR. L. H. CHILDS, Medical Director, Chevrolet Motor Division, Flint, Michigan.

"Physical Examination and Placement of Substandard Workers"—DR. PAUL J. OCHSNER, Medical Director Fisher Body Division, Lansing, Michigan (p. 283).

"Comments on Sickness Absenteeism"—A. T. COURT, Labor Economics Section, General Motors Corporation, Detroit, Michigan (p. 271).

"Processing Techniques in Physical Examination"—DR. F. B. WISHARD, Medical Director, Delco-Remy Division, Anderson, Indiana (p. 253).

"Placement and Health Maintenance Among Women in Industry"—DR. MAX BURNELL, Medical Director AC Spark Plug Division, Flint, Michigan (p. 282).

Evening, Friday, April 24, 1942

DR. M. R. HUFFMAN, Chairman:
Host—E. E. WILSON, Director General Motors Proving Grounds.
Dinner at Proving Grounds.
Address—B. D. KUNKLE, Vice-President General Motors (p. 245).

Morning, Saturday, April 25, 1942

DR. C. G. DARLING, Chairman:
Welcome—I. B. BABCOCK, President Yellow Truck and Coach Mfg. Co.

"Criteria in the Evaluation of Abnormal Hearts"—DR. ROBERT NOVY, Detroit, Michigan.

"The Humm-Wadsworth Test in Operation at the Lockheed-Vega Plant"—DR. F. E. POOLE, Medical Director Lockheed-Vega, Los Angeles, California (p. 260).

"Emergency Medical Service for Catastrophies"—DR. J. S. LAMBIE, Medical Director Fisher Body Division, Pontiac, Michigan (p. 248).

"Maintenance of Health in the Management Group"—DR. MARTIN I. HALL, Medical Director, New Departure Division, Bristol, Connecticut (p. 263).

"An Outline of Recent Researches in Industrial Hygiene"—L. B. CASE, General Motors Research Laboratory, Detroit, Michigan (p. 250).

"Industrial Physicians in the War Effort"—MAJOR SAM F. SEELEY, M.D., Executive Officer Procurement and Assignment Service, Washington.

Afternoon, Saturday, April 25, 1942

DR. M. R. HUFFMAN, Chairman:
"Injection Treatment vs. Operation in Hernial Repair"—DR. HOWARD BARKER, Pontiac, Michigan (p. 280).

"Danger To And Repair of Nervous Tissue"—DR. E. S. GURDJIAN, Detroit.

"Treatment of Burns"—DR. GROVER PENBERTHY, Detroit, Michigan (p. 277).

"Rehabilitation in Industry of Convalescents From Tuberculosis"—DR. GEORGE SHERMAN, Michigan State College, Lansing, Michigan (p. 267).

"Experiences With 4 by 5 Films"—DR. G. E. GUNDERSEN, Medical Director Oldsmobile Division, Lansing, Michigan, (p. 270).

several instances dust collectors, where due precautions have not been exercised, have exploded, although fortunately no serious accidents have occurred as a result of such explosions. The material has to be heat treated and properly controlled during the entire process. Owing to the use of magnesium in the airplane engine production in our plants, a new foundry is being built with a manufacturing capacity of one and one-half million pounds of magnesium per month, and the machining operations in these castings will be carried on in a considerable number of our plants, so that here we come in contact in a large way with a material that has to be definitely controlled, and on which there has been practically no experience in its handling, so far as our organizations are concerned.

Aluminum

ALUMINUM is also being much more extensively used, but as a result of past experience we are much more familiar with the handling of this material, so that the hazard is relatively less as compared to magnesium.

One might go on at great length to enumerate new problems that are coming into the picture, particularly relating to materials, compounds and processes. But I am sure enough has been said, together with the very detailed study which I know you men are giving the specific problems in your own plants, to make a further enlargement on this phase of the operations unnecessary.

Personnel—Selection and Placement

THE total war production load which the General Motors Corporation has been asked to assume is of such proportions that when we are in full operation it will mean a substantial addition to our present personnel. Besides, the loss of many operators through draft will necessitate a much more extensive use of women operators and undoubtedly will require taking on boys and older men where they are capable of performing the operations. This should all be accepted as a part of our war program, but it means that so far as the selection of employees is concerned, greater precautions should be exercised than ever in their acceptance; and while the need for workers is going to be great, and possible eliminations will be largely reduced, the medical departments will be in a position to be of great service to the manufacturing divisions if they will give due consideration and guidance in the placing of workers where because of any physical unfitness it should be recognized that there are certain classes of operations on which certain individuals should not be permitted to work. It also goes without saying that because of the rapid increase of demand and the over-burdening of manufacturing facilities, in some instances the handling of material may be much more of a hand proposition, and therefore strains and hernia accidents will undoubtedly increase unless unusual efforts are made to see that the proper placing of employees is done. While the program in general will be tempered with good judgment, so far as working hours are concerned, when an organization or a plant is working under the strain that many of our plants now are and will be for some indefinite time in the future, extended hours will not be unusual, so that possible results from over-exertion or fatigue will also play a part in adding hazards to ordinary operations.

Since the increase of employment is not confined alone to General Motors, every effort will be made to employ all persons available who can perform needed operations. This necessarily means that in some instances there will be a greater exposure to communicable disease, so that ways and means should be developed for detecting such conditions which will aid in their correction or prevention, and thereby protect the health of other operators in the same plant.

Increase in Medical Departments

IN THE FACE of the foregoing conditions, there will undoubtedly be a greater demand on the services of the medical departments than we have known heretofore in the organization. The increased number of employees alone will require expansion of the service, and this at a time when there is great demand elsewhere for similar service is going to make the staffing of our health maintenance departments much more difficult. Just as we are planning to select and train operators for our manufacturing processes, so the medical department should be on the lookout for individuals whose abilities will adapt them to service of this kind, and to bring them under the type of training which will fit them for satisfactory service under these conditions.

Medical Department Records

IN ONE of the plants which I visited some months ago I was much impressed with the record that was being kept of the frequency and character of service being given to individuals throughout the plant. With the increased normal burden it may be more difficult to keep definite records under pressure conditions, but it seems to me that of all times this is the most important for establishing and maintaining such records, both for the information of the medical department, and for the guidance of the department heads in the placing of employees on jobs which will not contribute to loss of time or delinquency. Such records are a great help in the ordinary operation of the plant, and also in handling individual cases that may develop where the claimed injury of employees is of a questionable character.

Responsibility of Medical Departments

ALL IN ALL, the great objective before our organization at the present time is to secure maximum production in the least possible time with the least possible loss. Therefore, it follows that in this great effort the medical departments in our various plants have a much more important function to perform, if that were possible, than they have had in the past. Every hour of work lost by an operator means that much less production toward the war effort, so that there is a three-fold responsibility in the hands of our medical departments:

First, to maintain due diligence in the selection of employees to the end that persons employed are physically capable of doing the work for which they are being employed without *undue* hazard to themselves or their fellow workers;

Second, to be constantly on the alert to detect any consequences of new operations or new processes which may result injuriously to the operators on the job, and keep the supervision informed accordingly; and,

Third, to maintain a program of health maintenance which will act as a guide to the supervision in the plants as to the placement of employees.

The entire program should maintain and support the highest possible productive effort on the part of the individual operators.

Commendable progress has been made as a result of the efforts of you men, individually and collectively, in the improvement of health maintenance throughout our manufacturing organizations. When we stop to consider that the full obligation the General Motors Corporation has assumed will carry employment approximately 50% above its highest previous peak, some measure of the increased responsibilities can be understood. This responsibility extends to the medical department as well as to every other department of our plant operations, because the task can only be accomplished by a full coordination of all our efforts.

So much has already been said that there is no need of flag waving to spur you on to a recognition of your full responsibilities. War is a serious business, and we are confronted with the most serious war that our nation has yet experienced. Ultimate victory depends upon how well each one of us understands and gives himself unreservedly to the tremendous task ahead.

Emergency Medical Service

—For Catastrophies—

J. S. LAMBIE, M.D.,
Medical Director, Fisher Body Division, General Motors Corporation

WARFARE has always been dependent on industry to manufacture its weapons. And the trend in the past century has been for the men of Mars to become increasingly dependent on the sons of Vulcan for the weapons of war. Now we are told that the war may be won or lost in the factories of America. The strategy of the enemy demands the destruction of not only the navy with its fleets and the army with its forts that bar the way but also the factories which are supplying the army and navy. In fact, with the advent of aerial warfare we see the first and second lines of defense of various nations being by-pased by invading armies and attacks made far in the rear on those whose work is necessary to keep the soldiers at the front. In other words modern warfare has as a prime military objective the factories of the nations which are at war. It is not only by direct aerial attack but also by sabotage of fifth columnists that the aggressors strike at these targets. This imposes on industries in wartime the additional task of defending themselves. Definite plans must be made by management to anticipate these major catastrophies, and in these plans the medical service in industry must of necessity play a large part.

In our plant a group has been formed known as coordinators of defense plant protection. This group consists of a fire marshal, safety supervisor, plant physician, chief of plant protection and the plant engineer. The group is headed by the plant manager or his designated representative. At first strict lines are not drawn between these activities, rather, the duties of all members are closely coordinated so each will be grounded in the functions of all relative to plant protection—assignment of duties to each coordinator to follow as the plan is developed.

Instruction is given to the supervisory force of the plant in the subjects of plant protection, fire prevention, first aid, and on sabotage, blackout material and air raid alarms.

The plant itself is divided into districts, each district to have as a leader one of the supervisors ordinarily at work in that district. At the time of emergency he will take immediate charge, using such means of fire control as may be located in that district, also attending to such rescue work and first aid as may be indicated until reinforcements arrive. In case demolition or explosive bombs are used instead of incendiaries special equipment has been prepared for the rescue work. This is conveniently arranged in a special cart under the control of the plant engineer.

We will confine our remarks to the medical service for catastrophies. This naturally commences with rescue and first aid work. The course as given to the supervisory personnel and selected employees in first aid is the abbreviated course as planned by the Office

of Civilian Defense. This is really a course for rescue work with rather elementary first aid added, as it is contemplated to have advanced first aid stations under the control of a doctor located as near the scene of the disaster as possible. In each of the districts into which the plant is divided we have stretchers and blankets permanently stored, also the captain of each rescue squad will be provided with a canvas bag similar to the usual Boy Scout haversack which will contain a certain amount of first aid equipment—bandages, sterile compresses, adhesive plaster, wire roll splints, field tourniquet, sodium bicarbonate solution and flash lights. The plant physician has trained groups of selected men to act as captains of emergency squads, and each captain trains a group of eight or 10 men to serve on his squad, so that it is planned to have approximately 5% of the personnel trained in rescue work. It is expected that the plant hospital will be used as a casualty station during an emergency. Additional supplies such as the Army-type litter, blankets, a reserve of sterile compresses, a considerable number of which should be large as 8 x 10 or 10 x 12, materials for treating burns on a large scale, local anesthetics and an abundant supply of morphine and materials for treatment of shock, etc., should be kept on hand. To this casualty station will be assigned in case of emergency an operating team of doctors, designated by the emergency medical director of the county or city.

It is obvious that the disaster may be so overwhelming as to swamp local facilities, so that defense plant efforts as above described must dovetail with the united effort of the community in the defense of their homes and their means of making a livelihood. Therefore we give briefly the general plan for civilian defense. In this area this is outlined as follows: A metropolitan area has been designated for southeast Michigan comprising the counties of Wayne, Oakland and McComb, with headquarters in Detroit. Subdivisions of this area are made with the idea of decentralizing administration and expediting planning, so that in Oakland county we have an organization copied after the parent organization of the metropolitan area. This county organization has a commander functioning under the metropolitan area commander and coordinating the efforts of existing fire departments with the newly-trained fire wardens, the police, public utilities, public works, relief organizations, transportation, messenger service and, last but by no means least, emergency medical relief.

A local chief of emergency medical relief is appointed whose task it is to organize the doctors and nurses of the county into surgical teams, provide emergency beds in hospitals, secure adequate ambulance service, make provision for a reserve of hospital and surgical supplies—in short to arrange matters so that in time of emergency confusion and inefficiency will be kept at a minimum.

REFER now to the original chart which is a part of Bulletin No. 2 gotten out by the national chief of emergency medical service and which depicts in general the organization for Oakland county. At first the plan was to have surgical teams based on the hospitals in the area and proceeding from these hospitals to the scene of disaster. This plan undoubtedly would operate satisfactorily in smaller areas. But for an area the size of Oakland county—which has, in addition to the large General Motors factories in Pontiac, a great number of smaller factories in other parts of the county—and in order to meet the general civilian defense needs, it was thought best to zone the county and have local teams in the smaller towns which could be self-contained, calling upon the larger group in Pontiac only when overwhelmed—all of the facilities of Pontiac, however, being available to any group in the county. The city of Pontiac itself is divided into five zones, in all of which are one or more large factories. Each zone has a casualty station designated, and a surgical team for each station. An alternate station is named in case the primary station cannot be used because of the emergency. The surgical teams are composed of four doctors and a group of nurses, who report to the casualty station during the emergency. The team captain is in complete charge of his area; he has been instructed to send one of the doctors and a nurse or first aid attendant to contact the rescue squads and to establish a first aid post as close to the scene of disaster as possible. From the first aid posts the stretcher teams will relay the more injured with as slight a delay as possible back to the casualty stations, which also are located fairly close to the emergency zone.

Supplies for the casualty station are composed of the materials designated in Bulletin No. 2 and are packed in large and small boxes. They can be readily moved in case the casualty station itself becomes untenable because of the nature of the disaster. Also in case any zone medical captain is needed to reinforce because of an unusually large disaster in another zone he can readily take necessary supplies with him. The contents of the small box are ample for the needs of the one-man physician team who is sent forward from the casualty station to contact the rescue squads. This physician's work (at the first aid station) is necessarily confined to life-saving procedures, hemostasis, artificial respiration, measures to reduce shock, splinting of fractures and relief from pain.

Work at the casualty station will be along similar lines. Ligation of arteries may be done here, splints will be adjusted, pain will be relieved and the patient put in as good condition as possible for transfer to the hospital. Here minor surgical operations may be performed if time permits. In every case records are kept, diagnosis tags placed on the patient and a selection of cases made according to the various types of injuries and the vacant beds in hospitals at our command. It is presumed that perhaps 20% of the cases will be severe—and these will be sent to the main civilian hospitals. Cases of moderate severity will be sent to the emergency hospitals we are creating, and the less severely wounded sent home.

At the time the alarm is sounded the chief of the ambulance service will contact the control center for instructions. A considerable number of ambulances will be available to the captain of the surgical team for evacuation of patients to the general hospitals, and these ambulances allocated to a zone will report to the zone medical captain and receive instructions from him. In case the ambulances provided are insufficient in number, emergency ambulances have been secured by utilization of commercial delivery trucks of suitable size and arrangement for holding litters; these have all been volunteered by the owners.

In the base hospitals the doctors have been arranged in surgical teams, with the chief of staff in each case selected to direct the care for the patients sent to his hospital. He has been instructed to see that certain surgical supplies will be available. All told in this area approximately 300 beds have been made available in case of emergency. We are fortunate in having one druggist who will act as a wholesaler in the matter of such supplies as blood plasma, narcotics, etc. He will maintain a 24-hour service for this purpose. The Red Cross has valiantly donated hospital supplies such as bandages, blankets, surgical gowns and pajamas.

To the surgical teams throughout the county have been distributed the emergency medical supplies, as listed in Bulletin No. 2. The county board of auditors has underwritten the cost of these emergency supplies, which have been packed under the supervision of the chief of emergency medical service. They are then purchased by the local cities, towns and townships for use of the surgical teams in that area.

The nurses of the county have been organized by the leaders of the various nursing organizations in the county and arranged into groups. In time of emergency we have arranged a chain system of notification. There has been no lack of cooperation on the part of any of the professional people of the county. It must be admitted however that sufficient drills have not been had up to the present, but it is hoped, with the completion of organization and the distribution of the supplies, that this defect will be taken care of. We have thought that any plan to be successful must have an organization in which each participant is assigned specific duties in clearly defined localities. He must be fully acquainted with the nature of those duties. He must know where his contacts are with those associated with him, and the bounds of his authority. Once given authority he must enforce that authority in the region assigned him, and bend every effort to the accomplishment of his mission.

Despite all planning, success or failure depends on the initiative, energy and nerve of individuals. We think our personnel have these qualities, but that is something yet to be proved.

Recent Researches in Industrial Hygiene

—An Outline—

L. B. CASE,
General Motors Research Laboratory

THE questions arise with respect to the title Dr. Lambie has selected for the paper: What is the scope of the term "recent?" What may be classified as "Industrial Hygiene?" It seems appropriate to assume a rather liberal attitude toward these terms and not to attempt to define or restrict them. The various investigations which will be mentioned briefly have been reported in publications to which we have convenient access.

No doubt there are numerous others of merit that have not come to our attention.

CARBON MONOXIDE: Carbon monoxide is a classical poison and is the subject of numerous references. The American Standards Association has recommended a maximum allowable concentration of 100 parts per million for exposures not exceeding eight hours daily and 400 parts per million for exposures not exceeding one hour daily provided the oxygen is not less than 19%.

This recommendation is in general harmony with previous suggestions and practices. It is based upon a review of available information (U. S. Public Health Service).

The mechanism of carbon monoxide poisoning is the subject of Public Health Bulletin No. 274. Various measurements made on dogs which had been severely exposed are reported. An abstract in *Journal of Industrial Hygiene & Toxicology* (September, 1941) refers to experiments wherein rats were severely exposed to carbon monoxide and then treated with x-ray, with apparently favorable results.

DERMATITIS: It is frequently stated that dermatitis is the most prevalent of all the occupational ailments. Many references to it are found in the current literature. Those that have come to our attention usually have related to random episodes rather than to systematic investigations. In spite of the importance of the subject, an attempt to summarize or comment seems inappropriate in this place. The matter, however, should not be dismissed without mention of the book, and the bulletins, short articles, and lectures, for which Dr. Louis Schwartz has been responsible.

DUSTS: Silica has been and apparently continues to be the principal item of interest among the various kinds of dust. In recent years, various experiments have related to the influence of particle size and to the tendencies of other kinds of dust to retard the development of silicosis.

The commonly employed methods of collecting and counting dust samples may be accepted as a moderately plausible indication of the concentration of particles between approximately one and approximately 10 microns in magnitude. Dr. Gardner has reported that experiments made at the Saranac Laboratory have indicated that particles of silica larger than three microns may not be very important. Tebbens has reported experiments indicating that particles of silica approximately one micron in magnitude are especially detrimental when injected into the veins of rabbits.

Van Wijk and Patterson have reported an investigation of the percentage of particles of different sizes removed from dust-laden air by breathing. The report indicates that about 25% of the particles of 0.2 microns and about 80% of the 2 micron size are removed. Larger sizes are removed even more completely. Removal by breathing does not, of course, necessarily involve prolonged retention.

Berkelhamer, of the Saranac Laboratory, has studied the settling rates of several varieties of dust and mixtures thereof. Many experimental difficulties are involved in investigations of the kind. The results serve to emphasize that settling rates are influenced by numerous factors.

The possibility of preventing or retarding the development of silicosis by powdered metallic aluminum, aluminum hydroxide, iron oxide, coal, or sundry other substances, has been the subject of a substantial number of experimental investigations. Crombie and Blaisdell have reported cautiously an apparent alleviation in 10 of 14 cases of human silicosis to which powdered aluminum was administered by inhalation. They recognize, however, that the chief value of aluminum appears to be prevention rather than alleviation.

Miller and Sayers have reported an extensive series of experiments under the title "The Response of Peritoneal Tissue to Industrial Dusts." The dusts used in the experiments are classified into three groups: "Dusts causing an absorptive reaction," "dusts causing a proliferative reaction," and "dusts causing an inert reaction." The titles are defined by the authors: "An absorptive reaction may indicate that a dust is relatively harmless, while a proliferative reaction, characteristic of quartz, may be associated with the ability to produce pulmonary fibrosis. Dusts of the inert group, that is, those that show a tendency to remain in the tissues, should be considered as potentially harmful, but not so dangerous as those causing a proliferative response." It is of interest to note that two commonly used abrasives, aluminum oxide and silicon carbide, are placed in the "inert" group. Metallic iron and the magnetic oxide of iron are not included in the tests. They are prominent ingredients in the detritus from many grinding operations. Jewelers rouge, which is principally an oxide of iron (ferric oxide), is classified in the "inert" group. It is also of interest to note that tripoli is placed in the proliferative

group. Tripoli has been used extensively as an ingredient of polishes and of foundry facings.

FATIGUE: The physiological, psychological, mechanical, chemical, and economic factors in fatigue have been the subject of much study and many experiments during recent years. The subject has many ramifications. It is too extensive, too complicated, and perhaps too indecisive, for useful inclusion in a general outline of this sort. In a paper entitled "Findings from Major Studies of Fatigue," Dr. Sayers summarized the present status of the matter for the annual meeting of the Industrial Hygiene Foundation last fall.

Excessive fatigue is obviously detrimental. Some degree of fatigue is obviously unavoidable. Apparently the investigations to date have not progressed sufficiently to indicate a basis for deciding what is reasonable or proper in every situation which may arise.

LEAD: Lead continues to be one of the principal subjects of hygiene interest. Seven papers relating to it were presented at the recent meeting of the American Industrial Hygiene Association.*

Dr. Kehoe and his associates have continued their experiments relating to ingestion and excretion of lead. In these, elimination of lead is proceeding slowly after discontinuance of administration. The comparatively slow rate may be interpreted to indicate that the lead is retained in a rather stable form of combination.

Fairhall and his colleagues have reported that different compounds of lead have different degrees of toxicity. Harrold has discussed experiments and observations which were made under shop conditions and which indicate a rather high tolerance for chromate, at least in the form of paint.

Various aspects of lead arsenate as a spray for fruit trees have been investigated quite extensively. There does not appear to have been a very serious amount of absorption among apple orchardists or among the consumers of the fruit. The matter is the subject of Public Health Bulletin No. 267. Experiments conducted at the University of Oregon Medical School are interpreted to indicate that the substance of the apple is capable of affording protection against the toxic effects of lead. Several other supplementary investigations were made. They relate to the urinary excretion of lead and arsenic.

Public Health Bulletin No. 262 pertains to the storage battery industry; 760 men were examined; 177 had a combination of clinical and laboratory findings referable to lead absorption; 360 samples were collected and analyzed to determine the amounts of lead in the workroom air. In estimating the exposure of an individual, due cognizance was taken of any recent changes in ventilation or occupation. The results of the investigation are interpreted to confirm the previously recommended limit of 1.5 milligrams of lead per 10 cubic meters of air.

Dr. Lester W. Sanders, of the Kettering Laboratory of Applied Physiology, has reported under the title "Measurement of Industrial Lead Exposure by Determination of Stippling of the Erythrocytes." His data may be interpreted to indicate that stippled cells are not a reliable criterion of lead absorption or of the milder forms of lead intoxication. Comparatively high ratios of stippling were found quite frequently in four groups of healthy men who had no industrial exposure to lead. The data demonstrated cyclic variation in stippling among healthy unexposed individuals. Lead absorption, as shown by analysis of blood and urine, was not always accompanied by unusual stippling in three groups of men who had been exposed in varying degrees.

*Third Annual Meeting, Cincinnati, April 13-17, 1942.

MAGNESIUM: Interest in magnesium has been stimulated by its extensive use for parts of aircraft. McCord, Meek, and Harrold have published the results of an investigation entitled "Chemical Gas Gangrene from Metallic Magnesium" (INDUSTRIAL MEDICINE, February, 1942). Magnesium or high-magnesium alloy, was introduced into or beneath the skins of animals by several methods including subcutaneous injection of powder. Gaseous tumors resulted from the subcutaneous injection. Similar results were not obtained with aluminum. The matter was discussed by Dr. Meek at the meeting of the Michigan Industrial Hygiene Society (March 27, 1942) at Detroit, and before the meeting of the American Industrial Hygiene Association (April 16, 1942) at Cincinnati.

Schulz and Walter presented a paper "Splinter Wounds from Light Metals" at Cincinnati (April 16, 1942) and recommend that splinters of magnesium be removed thoroughly. Aluminum and its alloys failed to produce more than a fibrous tissue proliferation.

The fire and explosion hazards involved in the machining or grinding of magnesium alloys have been the subject of several published papers. The Bureau of Mines has reported regarding the explosive limits of magnesium, aluminum, and zinc powders. Hard granulated pitch has been suggested as a means of controlling magnesium fires in factories, and for minimizing damage from incendiary bombs.

No information relative to the effects of inhaling finely divided magnesium has come to our attention.

MANGANESE: The effects of absorption of excessive amounts of manganese are reported to be disabling and incurable. Interest is stimulated by the fact that under present and prospective conditions, domestic deposits of ore must be further developed.

Public Health Bulletin No. 247, "Chronic Manganese Poisoning in an Ore Crushing Mill," reports results of physical examinations, x-ray examinations, analyses of sundry physiological products, and air-tests. A bibliography of 40 items is appended. The number of men, however, was not large enough for the investigation to serve as an adequate basis for establishing a permissible limit.

MERCURY: The use of compounds of mercury in the manufacture of felt hats has been the subject of investigation and discussion for a long time. We are informed that its use in the industry has been discontinued recently. The details of the exposure are discussed in Public Health Bulletin No. 263. A paper, "A Safe Substitute for Mercury in Certain Industries," was presented by Dr. Beal of the Mellon Institute at the meeting of the Industrial Hygiene Foundation last fall.

The Bureau of Mines and the Bureau of Standards have reported questionable concentrations of mercury vapor in the air in certain laboratories.

RADIOACTIVITY: The use of powerful x-ray equipment for detecting flaws in castings and in welds has increased greatly during the past few years. The Bureau of Standards has published papers relating to the measurement of radiation and the value of concrete as a protective agency.

Unfavorable results and unfavorable publicity followed the ingestion of radioactive paint by a number of women who painted luminous dials during the preceding war. A paper by Professor F. B. Flinn dealing with the subject was published in INDUSTRIAL MEDICINE (October, 1941). The Bureau of Standards has investigated the matter and has issued Handbook H27, "Safe Handling of Radioactive Luminous Compounds," which specifies a maximum of 0.1 roentgens per day and a maximum of 10-11 curies of radon or thoron per liter of air.

Two papers dealing with the subject were presented at the recent meeting of the American Industrial Hygiene Association at Cincinnati and will be published.*

"Determination of the Thoron Content of Air and Its Bearing on Lung Cancer Hazards in Industry," by Evans and Goodman, is of interest in this connection. It is published in *Journal of Industrial Hygiene & Toxicology* (March, 1940) and has a bibliography of 27 items appended.

SOLVENTS: Because of the extensive use and distribution of the material, Dr. Machle's paper, "Gasoline Intoxication," is of especial interest. The subject is treated systematically and thoroughly. Dr. Machle reminds his readers that the term "Gasoline" refers to mixtures having variable compositions and states that the effects produced also are variable. He is inclined to question the limit of 1000 parts per million sometimes quoted. Presumably his comment may be extended to include the somewhat less volatile distillates used for thinning paint, washing metal, etc.

A question arises as to the hygiene significance of the aromatic hydrocarbons found in petroleum distillates.

Public Health Bulletin No. 255, "Toxicity and Potential Dangers of Aliphatic and Aromatic Hydrocarbons," is a critical survey of the pertinent literature by Von Oettingen.

Schwarz and Teleky discuss benzol in *Journal of Industrial Hygiene & Toxicology* (January, 1941) and append a bibliography of 94 items, many of foreign origin. In the same issue, Schrenk and his associates report with respect to "Absorption, Distribution, and Elimination of Benzene by Body Tissues and Fluids of Dogs exposed to Benzene Vapor." "Recovery Following Exposure to Benzene" was studied by Goldwater and Tewksbury. Reports of other investigations also serve to confirm the previously established idea that benzol merits respect and caution.

Von Oettingen, Neal and Donahue, issued a preliminary report, "The Toxicity and Potential Dangers of Toluene." They are inclined to question the commonly accepted limit of 200 parts per million and will conduct further experiments. They also note that, in contrast to experience with benzene, the sulphate ratio is not noticeably affected by exposure to toluene.

Interest in carbon disulphide has grown with the viscose industry and continues to receive attention by various investigators. Department of Labor Bulletin No. 34, "Occupational Poisoning in the Viscose Rayon Industry," by Dr. Alice Hamilton, issued in 1940, pertains to the hygiene status of the industry at that time.

METHODS OF TESTING: A book, "Analytical Chemistry of Industrial Poisons, Hazards and Solvents," by Jacobs, was issued in 1941. There are 660 pages. Numerous methods from many stated sources have been compiled and indexed.

There has been a tendency during the recent years to use physical methods, as distinguished from the commoner chemical procedures. The equipment generally is rather expensive and the calibrations frequently are quite complicated. In many instances, however, these disadvantages are compensated adequately by the number of tests that can be made within short periods of time.

The spectrograph, as used to analyze the light omitted at high temperatures by a variety of elements, is an effective qualitative tool. With various accessories and with proper calibration, it is used extensively for quantitative purposes. Spectrophotometry is a phase of the larger art of spectroscopy. Light of a suitable wave length is passed into the substance being tested and the amount of light absorbed is determined. Apparatus based on this principle has been recommended for the determination, in air, of the vapors of various substances, including mercury, xylene, toluene, benzene, tetrachlorethylene, trichlorethylene, carbon disulphide, hydrogen sulphide and gasoline.

A slender beam of x-rays passing through certain substances is scattered in a manner which is characteristic of the substance. When the procedure is properly controlled and when no interferences occur, the amounts of substances in mixtures may be estimated by comparing the intensities of lines produced on photographic emulsions. The method is advantageous in that only small quantities of the sample are required and that the sample may be finely powdered. It is also advantageous, as compared to the omission spectrograph, in that it distinguishes between compounds whereas the omission spectrograph is useful only for elements. Ballard and Schrenk, of the Bureau of Mines, have discussed the determination of quartz. "X-ray Diffraction—An Important Tool in Pneumoconiosis Research and a New Method of Tissue Analysis," by Berkelhamer, is of special interest.

The use of the polarograph is developing slowly. In this procedure, a small electric current passes through a dilute solution of the substance, or substances, being estimated. The principal feature of the apparatus is the "dropping mercury electrode," i.e., minute drops which form on, and drop from, the end of a capillary tube. The other electrode is a pool of mercury. A curve showing the relation of current to voltage is plotted, either automatically or manually. Under the conditions indicated, irregularities occur in the curve as the voltage is changed. The position of an irregularity with respect to the voltage scale is characteristic of the substance producing it, and the magnitude of the irregularity is a function of the concentration of the substance producing it. As in all other procedures, sundry interferences and complications exist.

Edgar and Paneth, in *Journal of the Chemical Society* (September, 1941) have described an extremely sensitive procedure for the determination of ozone and nitrogen dioxide in the atmosphere. The gases are absorbed on specially prepared silica gel, while cooled in liquid air, and subsequently separated by distillation at minus 120°C. The amounts of ozone found in outdoor air (in England) varied from approximately one to approximately four parts per hundred million. The concentrations of nitrogen dioxide were somewhat less. The method is too slow and cumbersome for field use in industrial hygiene but is of interest for laboratory purposes.

Continuous automatic apparatus has been designed for recording the concentrations of several atmospheric contaminants including carbon disulphide and hydrogen sulphide. The use of recording apparatus apparently could be, and perhaps will be, extended.

VENTILATION: The design and arrangement of ventilating equipment has not been neglected. However, an attempt to summarize would be too voluminous for our present purpose. The matter should not be dismissed without mention of the bibliography, prepared by Hatch, which was included in a paper presented at the meeting of the Industrial Hygiene Foundation, and the booklet "Principles of Hood Design," by Dalla-Valle.

WELDING: The practice of welding has increased greatly in the past few years. Many young men have

*"The Prevention and Control of Hazards in the Radium Dial Painting Industry—L. F. CURTISS, Ph.D., Washington, D. C. "The Ventilation Requirements for Radium Dial Painting"—W. C. L. HEMEON, Boston; R. D. EVANS, Boston.

been, and are being, trained in the art. Several rather elaborate investigations have been conducted with respect to possible physiological effects.

Harrold, Meek, and McCord, exposed animals to the gases and fume from bare electrodes in one series of experiments and from coated electrodes in another. Substantial concentrations of "nitrous gases" were produced but no evidence of respiratory inflammation was observed. Methemoglobin was found in the blood of exposed rats. A limited number of production welders were examined at a time when the nitrogen dioxide concentration was only 13 parts per million and methemoglobinemia was established.

Von Haam and Groom also experimented with animals. Their report may be interpreted as indicating that the concentrations of fume commonly found in industry probably are not harmful.

Britton and Walsh have reported the examination of 286 welders of an average length of service of nine years. No disabilities or diseases characteristic of the occupation were observed.

Tebbins and Drinker have published the results of a series of experiments under the title "Ventilation in Arc Welding with Coated Electrodes."

Von Oettingen, in Public Health Bulletin No. 272, "The Toxicity and Potential Dangers of Nitrous Fumes," presents a summary of pertinent literature and appends an extensive bibliography.

Special Bulletin No. 5, U. S. Department of Labor, "Control of Welding Hazards in Defense Industries," summarizes the matter briefly and illustrates various expedients for local ventilation.

Dr. Gardner discussed "Effects of Arc Welding Fumes on Susceptibility to Tuberculosis" at the 1941 meeting of the Industrial Hygiene Foundation. The brief discussion constitutes a progress report with respect to a series of animal experiments. At the time of the report, no increase in susceptibility was found.

Some welding fluxes contain compounds of fluorine, especially those used for aluminum and for steels containing substantial amounts of chromium. Machle and Largent have conducted experiments relating to the metabolism of fluorides. They report that the small amounts normally ingested in food are eliminated. Storage occurs, however, when larger amounts are administered. The retention occurs largely in the bones. Roughness and other abnormalities are produced. These changes were not revealed by x-ray examination but were readily discernible when the jaw bones of sacrificed animals were examined. The experiments further indicate that the retained fluorine is not released, or perhaps, is released only at a slow rate.

The items mentioned in the preceding paragraphs constitute a rather lengthy and perhaps somewhat disconnected list. The list, however, may serve to indicate recent trends in thought and activity.

Processing Techniques

—In Physical Examination—

FRED B. WISHARD, M.D.,
Medical Director, Delco Remy Division, General Motors Corporation

THE success of the American production system is dependent on many factors of which two extremely important ones are:

1. Progression from one phase of assembly to the next; and
2. Elimination of repetitive operations.

In a tour through a well-organized industrial plant, one is at once impressed with the fact that while innumerable, dissimilar operations are being done, an atmosphere of order pervades the whole with each step properly placed in sequence and essential to the completion of the finished product.

This is necessary for two particular reasons:

1. The need for using available manpower to the best advantage, and
2. Waste motion (or material) represents an increased production cost which, in a highly competitive market, directly affects sales and profits. This is one essential difference between private industry and politically controlled or operated manufacturing units.

Although industrial medical practice has been a separate entity and a recognized specialty for many years, very little has been done until comparatively recently to improve its operating status—to streamline it to eliminate waste motion. During the past four or five years, the duties of the plant physician have more than doubled. In many plants, the physician has to pass on transfers, all changes of jobs, and manufacturing processes which entail hazardous operations or the use of toxic materials, and finds his time otherwise taken up in conferences and the like—and this in addition to what he used to consider his regular duties—emergency surgery, physical examinations, etc. Without organization he would never get his work done; he would either quit in disgust or suffer a nervous collapse.

Our own medical department was similar to those of the majority of industrial plants visited during the past few years. It had started out as a glorified step-

child of the employment office and had gradually expanded through the years to include radiography and other activities, but was still only too apparently an overgrown first aid station. When one considers the evolution of industrial medical practice, this is not at all difficult to understand. Originally, first aids were necessary evils, with some retired pensioner in charge. The fact that he had little, if any, knowledge of medicine or first aid training had no bearing on the matter. Every tool crib had its cigar box containing iodine and assorted bandages, while frequently certain workers acquired considerable renown for their skill in removing foreign bodies from eyes with toothpicks. So the first aid station came into being. Later on, practical nurses and, still later, graduates, were placed in charge under the supervision of some doctor who dropped in occasionally but never took it very seriously. Then came the full-time plant physician, who was willing enough, but who had to prove his worth to management, and who found it quite difficult to demonstrate the dollar value of intangibles. But gradually the scope of his activities increased until at the present time the ramifications of the medical department reach into all manufacturing departments and processes. At first, there was very little order and less system. Applicants for employment, reporting for physical examination, were conducted past employees being treated for wounds of all sorts; the odor of disinfectants permeated the air, and the impression on the candidate was that this must be a bloody place to work. It was always our luck to have a lot of accidents on days when hiring was heavy, so that the people coming in were certain to see us at our best—or worst.

There were other problems also, one being that of department lay-out. The nurses were constantly walking from one end of the place to the other, so that an eight-hour tour of duty resolved itself into a sort of "Bunion Derby." Patients were received in one room, taken down a long hall to the x-ray room, where they removed such articles of clothing as the nature of the examination required, then had to dress before being taken elsewhere for treatment or further examination. Using the x-ray room for disrobing and dressing prevented its being used for other purposes, so that it was only about 60% efficient. After taking the picture, the technician had to carry the cassette a considerable distance to the dark room for processing. She then had to take the wet film across a hall to the view box, later returning the film to the dark room for drying. If the doctor wished to see some one particular film, the technician had to wait until others in course of development were sufficiently processed to permit her to turn the light on or open the dark room door. Minor delays, yes, but in the aggregate entirely too much time was wasted, and when production schedules are up and the plants want their help, delay means the loss of a lot of production dollars, the ill will of the foremen and supervisors who want to know why they haven't gotten their men, and criticism of the personnel-medical set-up, until tempers get badly frayed and we say things we really shouldn't.

Another problem was that of individual, rather than collective, examinations. When several men are stripped in one large room, they resent the lack of privacy. While curtained booths help somewhat, they do not fully solve the problem. A solid door has a certain psychological value—even though there may be others on the other side, the closed door insures privacy.

These are only a few of the problems with which we had to contend. Through the years we had given the matter considerable thought, and we recognized that if we were willing to break with tradition, our production system had many features which were applicable to our own problems, such as elimination of repetitive motions, standardization of technic, and other features which would increase our efficiency.

IN PLANNING our lay-out, the first step was to classify our contacts into one of three main groups:

1. Pre-employment physical examinations:
2. Employees who had been off sick, reporting back for duty:
3. Employees on company time, reporting for treatment, examination or consultation.

Groups 1 and 2, i.e., pre-employment physical examinations, and those returning to work following absences from all causes, should not come in contact with group 3, dressings, etc., nor should those in group 3 come in contact with groups 1 and 2. To accomplish this, two waiting rooms would be required, so situated that a man coming from the shop would not get into the applicant's waiting room which communicated with the employment office and an outside factory entrance, nor should a prospective employee be able to get into the factory proper. This was quite important, for, in times past, applicants, or those off duty, would frequently be found wandering through the production departments. The most strict inspection at the factory gates would be futile if this by-pass existed.

It had long been our routine practice to take x-ray films in all cases of injury to bones and joints, no matter how presumably trivial the injury appeared to be. Although this necessitated quite a bit of extra work, experience has shown that it was fully justified. In addition, all applicants for employment, as well as those returning from sick leave, have chest films taken, also a film of bone or joint injury sustained in recent automobile accidents, etc. We felt that it would be better to have one radiographic unit of superior quality with a centrally located processing room, than to install two units and divide our activities and records. In order that the x-ray equipment might be equally accessible to both groups (old and new employees), we decided to locate this room first and arrange the other activities around it. In laying out a medical department, one should dismiss any idea of remodelling, as such, lest the completed job be no better than before. The fact that a certain unit, such as the first aid, or a waiting room always had been in this corner or that, does not necessarily mean that it was most efficient in that location.

As all our plants are conveniently situated with reference to a very excellent general hospital, we have never attempted to keep any patients over night, or perform any surgery in our plant set-up, which is essentially a minor dressing station and examination and consultation center. Many years ago, Dr. Allen B. Kanavel, of Chicago, educated us to the fact that tendon suturing and repair of traumatized extremities merited greater care than that afforded by kitchen-table technic. By referring our surgical work to the city hospital, our main planning problem was that of examination and consultation, with dressings and treatment playing a secondary role, We, therefore, broke down the entire procedure of physical examination of applicants into individual steps, which we arranged in sequence. It began with his reception in the applicant's waiting room where he was given a physical examination card and conducted into the preliminary examination room. Presuming that a complete examination, including photograph, finger-prints, chest x-ray and physical inspection takes 30 minutes, if the examining physician interests himself in each step of the procedure, he can only pass on some 16 applicants during an eight-hour day. But if he delegates the bulk of these duties to

others and confines himself solely to a review of the x-ray film and inspection of the candidate, he can handle from 12 to 15 per hour, i.e., 120 or more per day. Furthermore, a clever nurse can do many of these minor tasks far more quickly and efficiently than the doctor himself. In the matter of drawing blood specimens for serology, we have several nurses who are extremely adroit at hitting veins, and draw 100 or more bloods a day, as a matter of course. Our x-ray technician and her assistant are both graduate nurses, interested in radiology. To them, 100 or more chest films are a normal day's run, with the last as technically perfect as the first. This is very important, for aside from the diagnostic value of a well taken and properly processed film, there is a medicolegal angle; we might have to display some one film in court in the event of a damage suit, and nothing is more embarrassing than to attempt to defend a case by presenting inferior films, and, besides, it takes no more time and but little more effort to take a good picture than a poor one. For finger printing and photography, we trained two young women from our office staff.

THE functioning of the preliminary examination room is under the supervision of the nurse who draws the bloods. It is her duty to see that things go smoothly, that applicants are admitted promptly, treated politely and passed on to the x-ray department. The average applicant is frequently a bit confused and apprehensive. If he is made to wait any great length of time, is greeted in a brusque manner, or treated roughly, he at once gains an unfavorable impression of the medical department and of the corporation it represents, for quite frequently the only contacts an employee has with management are his foremen and the doctor. If we start a man off right, we seldom have much trouble with him later.

We first take his photograph for identification purposes, using a 35-mm. camera at 30 inches, 1/25th of a second exposure at f:4.5, with one No. 2 Photoflood bulb in a reflector. He is seated at the photograph table which was carefully designed for that purpose. His name, social security number and the date, together with "Delco Remy, G. M." are arranged on a "bulletin board" which is placed in position before him. The finished film shows this data below the picture of the person himself. All data are carefully checked, particularly the social security number, so that no mistake will be made. Having his picture taken by an attrative young woman makes him feel better and he is then ready for his finger prints. This done, he is stretched out on a cot and a blood specimen is drawn by the nurse before he has time to become alarmed. Further, very few men, or women either, will argue with a woman, which they might and probably would do if a man were to be drawing bloods, so that to date we have had practically no refusals, in some 9,000 cases. Occasionally some man faints (no women to date) and for that reason we always have them lie on a cot, for if a man faints and falls to the floor, he might injure himself seriously, and even if he does not, a 200-lb. man on the floor is somewhat of a problem to the attendants.

Points to consider:

1. Drawing a blood makes many persons nervous and they do not finger print or photograph well afterward.
2. To roll up his sleeve, the applicant must remove his coat or sweater. He then has to put the garment back on before being photographed.
3. When he lies down for his blood test he musses his hair and collar and then has to primp a while before having his picture taken—all of which takes time.

We, therefore, take the picture first, then the finger prints and, finally, draw the blood specimen. When this is done, he is conducted to the disrobing booth and does not need to pause to rearrange his hair or put on his sweater or coat. At the door of the disrobing booth, the nurse instructs him to strip to the waist, and slip on the poncho-like gown which he will find in the booth. The nurse takes him to the booth, rather than an ununiformed attendant, as it gives this step a more professional tone, particularly the instructions relative to disrobing. His examination card is placed in a rack on the x-ray room door and a signal given to the x-ray nurse, who goes to the booth and escorts the man across a narrow hall to the x-ray room, where his chest film is taken. An observant person can be of great value at this point. Our technicians, being graduate nurses, make a quick survey of the man's general appearance—rash or other skin disorders, deformities of the thorax and arms, spinal curvature, and many other things. They at once inform the examiner by means of our inter-departmental phone system. He comes to the x-ray room and may suggest other films, such as a lateral of the spine, film of the hip, or other part. The examiner would doubtless pick up these things in the course of his inspection later, but that would necessitate the man returning to the x-ray room, instruction of the technician as to what was desired, and considerable time lost. Our x-ray technicians have seen so many skin cases that they can diagnose secondary lues and other undesirable conditions at a glance. The chest film having been taken, the man resumes his gown and is escorted back to his booth by the technician who directs him to remove the rest of his clothes, lock the booth door from the inside and await the examiner. She then flashes a light which is seen in the examining room, takes the examination card to the examining room rack, returns to the x-ray room and hands the cassette containing the exposed film to her assistant. She is now ready for the next one. The assistant immediately starts processing the film in a temperature-controlled tank. We use standard Eastman x-ray developer and hypo at from 65-69° F for five minutes developing, five minutes fixing in the hypo. We do not use "refresher" chemicals. After 75, 14 x 17 films or their equivalent are run through, the tanks are drained, cleaned, and fresh solution introduced. Since we take about that number of films daily as a routine, the solutions are changed every day, and if the run is particularly heavy, we may pause in the middle of the afternoon to change our solutions. At first thought, this might appear to be wasteful, but we do not feel it to be so, for a good film used in evidence, can save, and in several instances has saved, enough to buy a lot of chemicals.

Within 10 minutes from the actual taking of the film, it is ready to be viewed by the examiner. The doctor notes the signal over the dressing booth door, goes to the rack and, taking the examination card left there by the x-ray technician, calls for the man by name, asking him to step out into the main examination room. The man steps out and goes immediately to the scales where he is weighed and his height noted. The matter of weight is of considerable importance. Most men, particularly lightweight ones, list their poundage at more than it really is. A month or so later particularly if they don't like their job, or the shift, they report back, complaining of loss of weight as evidence of an inability to eat, general nervousness and the like. We frequently find that many who think they are losing have actually gained in weight, so that they are not suffering as much as they think they are. This is particularly true of men on the night shifts who want to be transferred to days, or foundrymen who want jobs in other departments. We might have had weight and height recorded

in the preliminary examination room, but felt that it would be better to include it in the course of the physical examination, with the man stripped.

The examiner then takes a short history. We do not rely to any great degree on a history given at time of employment, for the average man in search of a job, will often very conveniently forget various items which might be of more than passing interest. If there are any objective signs, such as operative scars, deformities, etc., note is made of them. The blood pressure is then taken. While most younger persons will have a normal pressure, or even a hypotension, occasionally we find one with a marked hypertension—sufficiently often to justify taking a reading on all. The heart sounds are noted by means of a stethoscope for murmurs, arrhythmia, extra systole, etc. No effort is made to get breath sounds. The examiner then goes to the grid which separates the two through-the-wall view boxes and calls through the grid, which is light-proof but transmits sound, to the technician in the x-ray processing room, and asks for the film whose number was written on the examination card by the technician who took the chest film. All films have a number photographed into the corner, as a matter of permanent record. The technician then places that particular film in the view box, closes her side and turns the handle. The examiner can then open his side, the box becomes illuminated and the film is at hand for inspection in the presence of the applicant, who is usually quite interested and joins the examiner in viewing the film. If there is any pathology present, this is the proper moment to discuss it with the applicant. It has been our practice to take a flat film of everyone, and when any pathology is observed, return the man to the x-ray room for a stereoscopic series of his chest. We do this in all cases, even though there may be sufficient pathology present to justify rejection, such as presumably active pulmonary tuberculosis, etc., as we feel that we can learn enough from stereoscopic films of any one particular case to more than compensate us for the expense incurred. By this practice, we have built up quite a considerable library of stereoscopic films of about every sort of pulmonary disease from "Wheatena" to carcinoma (of which we have three cases of primary carcinoma of the lung).

PRESUMING that everything is all right so far, we next test his vision. In times past, we were constantly misplacing our reading chart (we test for close vision only on the theory that if a man can see to read, he can see distant objects sufficiently clearly to satisfy our demands)—so we arranged to have our examination cards printed with a type which, when held at 20 inches distance, indicated a 20/20 vision. Therefore, if the man can read the type on the examination card, he has a normal reading vision. In the event that he fails with either eye, he is then tested by means of a stereoscopic eye-testing apparatus which gives his visual factor for each eye and is so designed that it is quite impossible to cheat, even if he were so inclined, which of course, he would not be! By means of this machine, we can evaluate his vision within one or two minutes, check him for stereopsis, color blindness, etc. The examiner then tests his knee jerks, elbows, etc., palpates his abdomen for masses, has him stand up and checks him for hernia, has him walk about a bit to observe his gait and survey him generally, and if nothing else is noted, the inspection is over, and the applicant returns to his booth to resume his clothing. Items noted are recorded on the examination card and the applicant is ready to return to the personnel office for asignment to his job, and the examiner calls for another one. In all, this part of the examination took from five to seven minutes, frequently less, sometimes more, particularly in the case of rejections, where the examiner discusses the matter at considerable length with the applicant, explaining just why he cannot be taken on, and if some diseased condition be present, tuberculosis and the like, arranges for an appointment with the man's personal physician, and otherwise manifests some personal interest in the man's condition. We do not subscribe to the practice of rejecting a man and saying nothing about it—passing the buck to someone else to break the bad news to him.

It will be noted that at no time has the applicant come in contact with the other activities of the department. When he has dressed and walks out of the disrobing booth and through the short hall with which it communicates, he finds himself in the personnel waiting room—there is no other place for him to go. He cannot get out into the shop until he is officially taken there by a guide. Nor, as stated before, can an old employee with a bandaged arm or leg stumble into the examining unit to disturb the new applicants.

The outer door of the examining room opens into the first aid section, so that an employee, coming in from the shop, can be admitted to the examination room direct, without passing through the outer maze. If he is to disrobe, he can enter a booth and do so, and later on pass out into the first aid, and thus to his job.

The x-ray room likewise has two doors, one for applicants from the booths, and the other opening into a hall adjacent to the first aid. An employee can thus be admitted to the x-ray room via the first aid, and then wait in a booth located across from the x-ray room while the film is being developed. This film can be viewed in the through-the-wall view box in the manner described before, or, if it is a follow-up film, it is taken to the battery of view boxes, previous films are gotten out and comparisons made. As occasionally happens, an employee may have been sufficiently wounded to indicate hospitalization. All such cases are removed by ambulance, as we feel that anyone sufficiently hurt to justify hospitalization suffers less shock when taken away in an ambulance than would be the case if he were to walk out to a car and be driven over. With this in mind, an entry was arranged through the back end of the medical department, so that a stretcher can be brought directly into the x-ray room and the man removed without being observed by others in the first aid, and certainly not by any applicants for employment.

Summary

THE examination lay-out above described has more than doubled the efficiency of our examination procedure. It keeps applicants for employment from coming in contact with the other activities of the department.

Industrial Hygiene Problems

—In War Industries—

J. J. BLOOMFIELD,
Sanitary Engineer, U. S. Public Health Service

THE industrial hygienist's responsibility and his task is to keep the worker *healthy* and the job *safe*. Now that the transition from normal civilian production to all-out war effort is in full swing, that responsibility is greatly magnified and the task is complicated by new and re-newed problems in war industry.

These problems have their origin in the urgent demand for maximum production of war material in the

shortest possible time. This we must do if our enemies are to be answered in the only language they understand—that is, with guns, tanks, planes, and ships.

Indeed, with the exception of one or two vital raw materials, our only serious shortage today is *time*. Time to outstrip the start which the Axis has had on us for many years. Since there is no substitute for time, we must utilize it, as we must utilize manpower, to the best advantage.

One of the major sources of lost time is within industry itself—that is, time loss due to disability. Under war conditions we are already witnessing increases in fatal and disabling accidents and in industrial diseases.

Remarkable developments have taken place in industry within the past year. New machinery has been built with unprecedented speed; new processes are being constantly developed; and new substances are being placed on the market almost as soon as the demand is created. But these very industrial miracles are augmenting the health problems in industry. Perhaps we cannot work miracles for the mental and physical well-being of our war workers, but we can and must do everything in our power to reduce or prevent illness and accidents in industry.

The topic given me for discussion is of such wide scope that within the time allotted it will be possible to touch but lightly on some of the problems confronting war industries. Many of these have always been with us, but those which have been developed or precipitated by the war effort may be conveniently classified into three categories:

First, we have the problems resulting from the community environment in which the worker lives.

Second, we have those arising from the very character of the labor force itself.

And, third, we have those problems which are found in the working environment.

Community Facilities and the Worker

NO MATTER how ideal the working environment is made, the good accomplished will be nullified if living conditions are not favorable. For this reason, any consideration of industrial hygiene must include attention to community health. The war contracts allotted to date have been very unevenly distributed—geographically. As a result, there has been a migration of workers from many parts of the country to the unprepared, congested areas surrounding the war plants. For example, at one time 73% of the war contracts were allotted in 20 industrial centers containing 22% of the total population. Furthermore, as a safety measure, new war plants are being built in rural areas with very little thought to such important factors as sanitation, housing, schools, hospitals, and medical and welfare facilities.

"Priority" and "conversion" unemployment is sending many workers to critical areas in search of work. The state of Michigan is feeling the effect of just this type of migration. Communities have sprung up in corn fields, swamps, and rural areas in which no sanitation facilities have been provided or in which existing facilities are inadequate. Owing to the housing shortage, workers travel many miles to and from work, which exposes them to non-industrial accidents, already one of the three major causes of lost time in industry.

We are witnessing crowding in factories, crowding in homes, crowding everywhere, with the result that we are under the constant threat of epidemics which would seriously disrupt employment. Every necessary precaution must be taken to prevent such an occurrence. The lack of sufficient proper housing, medical facilities, schools, recreation and other welfare services, serves seriously to disrupt normal family life. Add to this the mental strain caused by war worries, and we have created a condition which is certainly not conducive to good morale. Some of these urgent needs in emergency areas will be taken care of by the Community Facilities Act, but the sum appropriated is very meager and to date the actual construction work on some of these facilities has been very slow.

Composition of Labor Force

THE Bureau of Labor Statistics has estimated that as of March 1, 1942, about 8,250,000 persons were at work in armament, shipbuilding, munitions and construction industries, while 2,000,000 were enrolled in the armed forces. If we add a reasonable number of employees for such industries as transportation, public utilities, food processing, and agriculture, the total war labor force by the end of this year will be 15,000,000, and for 1943, 23,000,000. There have been many guesses as to the number of workers in industry needed to support one man in the armed forces. The most conservative estimate is 4.5 workers in industry for each man in the armed forces. This means that if we take into account every person between the ages of 15 and 65, except the mentally and physically unfit, and women with children under 10 years of age, our country is statistically capable of supporting an armed force of about 10,000,000. In any event, there will be more men and women employed in industry than ever before in our history.

As industrial hygienists, we also have to deal with problems resulting from changes in the composition of the working force. Prior to the war, employers could make careful selection of the personnel employed, since there was an ample labor supply available. Today the needs of our armed forces, the geographical location of war industries, the uneven distribution of war contracts, priorities and conversion are all creating dislocations and shortages in labor.

One of the most notable changes in industry will be not so much in the numbers employed as in the sex composition of the labor force. Of the 50,000,000 women over 14 years of age who were listed in the 1940 census, nearly 13,000,000 were already at work. The remaining 37,000,000 women will probably comprise the nation's principal labor reserve. However, only about 13,000,000 of these women will be actually available to industry, because of age limitations, the need for farm labor, and the maintenance of our homes.

Although women excel in certain types of jobs requiring the use of repetitive skill, finger dexterity, and accuracy, they are also more susceptible to certain types of industrial disease. Furthermore, we must consider the fact that our highest tuberculosis death rates today are to be found among these women in the employable age groups, that is, among young women 15 to 24 years of age. The employment, therefore, of increasing numbers of women will bring with it problems of industrial hygiene significance.

The same may be said of the employment of the handicapped, the aged, and of young adults. Some of the younger workers lack training in specialized jobs. They are more likely to take greater chances and are not so willing to cooperate or make use of safety measures which older, more experienced workers have found expedient. The British experience already shows that accidents among the young workers have been on the increase.

Reports from individual plants already show an increase in the days lost from certain occupational

diseases as well as increases in certain types of non-industrial illnesses.

All of these factors present a definite challenge to the industrial hygienist. The task of the industrial physician will also be greater because of the shortage of medical personnel as physicians and nurses are inducted into the Army and Navy.

Problems of the Working Environment

IN 1940, approximately 18,000 people were killed in industrial accidents, nearly 90,000 suffered permanent impairment, and 1,782,000 had temporary disabilities lasting a day or more. Adding to these figures the losses from specific occupational diseases, and the even greater losses from general illnesses, we find that in normal times nearly 400,000,000 working days are lost each year. In wartime, when every pair of hands is needed for constructive war work, these conditions must be remedied. Preliminary estimates for 1941, made by the National Safety Council, already indicate an increase of 6% in fatal occupational accidents and more than 14% in the non-fatal injuries. Such factors as employment of new workers, relaxed safety measures, and poor working conditions, are credited as causes for these increases.

These estimates are based on peacetime statistics. In war, the factors affecting industrial diseases and accidents will multiply. For example, both men and machinery accustomed to working with steel (as in the automobile and truck industries), must be converted" to work with aluminum for planes. Whereas automobile bodies required the assembling of 600 pieces, one pair of wings requires 6,400 pieces. Many substances and processes unfamiliar to the worker will be introduced.

In a zealous attempt to obtain peak production, management and workers alike are apt to overlook matters relating to health or perhaps not even to recognize them, except when some unfortunate incident results in lost time. Furthermore, because time is precious, we are likely to find that vigilance in safety and health supervision may be relaxed. With machines operating 24 hours a day, there is likely to be less efficient maintenance of machinery—a potential source of more accidents.

All of these rapid developments make it imperative that practical measures be taken to determine the hazards involved and the control measures to be applied. Time does not permit me to discuss the everyday health problems arising from the working environment, but I shall present a few outstanding new problems which confront war industries.

SOLVENTS: Substitution of a non-toxic or less toxic material for a toxic substance has long been accepted as positive control of a health hazard. Now, owing to shortages or priority demands for essential production, it is necessary to substitute toxic substances for the less toxic ones. Benzol with its known harmful properties is being substituted as a solvent for toluol which, although a relatively safe substance, is an essential ingredient in making TNT. Even the supply of benzol is now threatened and this solvent probably will not be available for civilian production. This may mean that other solvents of unknown toxicity, or toxic halogenated hydrocarbons will be used more extensively.

The increased demand for solvents and the shortages of some of those in common use have led to the appearance of new solvents on the market. While it is claimed that many of these are non-toxic, a number are in the chlorinated hydrocarbon group of chemicals. We are already familiar with the toxic effects of some members of this group, such as carbon tetrachloride and trichlorethylene. Large quantities of these chlorinated solvents are used in vapor degreasing of metal parts, and in many cases the rate of production has been stepped up so high that condensation methods for collecting this vapor do not give adequate protection against contamination of the workroom air. Use of local exhaust ventilation, and if possible, enclosure of the process, are recommended in these cases. Protective clothing or creams are frequently essential to protect the worker's skin. The greatly increased use of chlorinated naphthalene waxes, especially for impregnating asbestos insulation on cables, has already caused many cases of dermatitis and systemic poisoning.

ABRASIVES: The silicosis hazard associated with abrasive blasting operations is increasing in magnitude since it has become necessary in new installations and in many old installations to return to the use of silica sand as an abrasive instead of steel shot or grit.

The nation-wide study of sand-blasting, made some 12 years ago, definitely showed that sand could be employed as an abrasive, if *properly designed* and *well maintained equipment* were used. Design and maintenance are especially important when abrasive sand-blasting cabinets, tables, and barrels are employed. In room blasting, well-housed and ventilated rooms are essential, and the worker must be protected by a helmet supplied with at least 6 cubic feet of dust-free air per minute. Certain types of automatic equipment are now available which will serve to reduce the dust hazard greatly. Again, it is necessary to repeat that the secret of protecting the sand-blaster is properly designed and well maintained equipment.

The substitution of silicon carbide cutting instruments for those of steel, as well as the replacement of cutting and milling with abrasive grinding processes, introduce new dust hazards which may be detrimental to health and certainly affect production adversely.

CUTTING OILS: As would be expected, the increased use of cutting oils has increased the number of cases of industrial dermatoses. We have recently encountered two unusual cases of poisoning due to cutting oils. One cutting oil which had been treated with sulfur chloride caused a dermatosis similar to chloracne, while the addition of sulfur to the cutting oil used in a process where machine threads were cut with silicon carbide abrasive wheels resulted in the liberation of enough hydrogen sulfide to cause poisoning.

METALS: The increased demand for mercury in the manufacture of munitions and scientific instruments has resulted in the reopening of old quicksilver mines. Many began operations without installing the equipment necessary to prevent the dissemination of mercury vapor and dust or to prevent their inhalation by the workers. The maximum allowable limit of mercury dust and vapor has now been established through the researches of the Public Health Service, and ways and means for reducing the mercury concentrations in air to the safe limit are available.

Alloys of unknown or implied industrial hygiene significance, and toxic metals such as cadmium are replacing aluminum and chromium. Control of possible fume or vapor hazards is indicated in these cases.

LUMINOUS PAINTS: Increased activity in radium dial painting, unless accompanied by engineering measures for safe handling, is likely to result in the experience of the first World War, when a number of cases of fatal poisoning occurred. Conditions found in recently established factories indicate that the hazard is not being met with adequate engineering protection in all instances. Recently the National Bureau of Standards has issued a Handbook (H. 27) setting forth in con-

siderable detail the precautions to be taken in the safe handling of radioactive luminous compounds. This manual contains, in addition to the various rules and regulations to be employed in such work, the proper type of radium dial painting hoods in which such work should be done. Experience has shown that if the methods outlined in this handbook for the handling of radioactive luminous compounds are followed, no injurious effects are produced.

X-RAY: The use of radium and of the roentgen ray for detection of flaws in metal castings and forgings is of increasing industrial hygiene significance. The use of radium for this work has come out of the experimental stage, while new x-ray machines have been developed which will test an average of 5,000 stressed parts per day as contrasted with 100 parts which was formerly considered a good day's work. The high amperages used to produce x-rays for industrial inspections, and the long periods of exposure to either x-rays or radium emanations, require much more complete protection than would be required in most medical x-ray installations. Operators should be protected with lead sheathing and other workers should not be allowed in the vicinity of the inspection operation. All sheathing should be tested and proved efficient against x-rays or radon. Testing rooms should be isolated from all other operations and walls should be sheathed with lead or other materials opaque to harmful radiations.

WELDING: One of the serious industrial hygiene problems confronting us today is the control of hazards resulting from the greatly increased use of the electric welding arc. We have long been familiar with the possibility of burns, electrical or from molten metal; with the dangerous effects of ultra-violet radiations accompanying the flash from the arc; of the possibility, in a confined location, of severe and even fatal poisoning from oxides of nitrogen fixed by the arc; of metal fume fever resulting from breathing zinc oxide fumes produced when welding galvanized iron, and of exposures to carbon monoxide and other products of incomplete combustion of the welding rod coating. We have also become familiar with the possibility of lead poisoning when welding or cutting painted parts; with the ill effects of fluorides used in the coatings for electrodes when welding stainless steel. There have also been serious epidemics of eye infections which may have been due to a combination of unknown factors and transmission of the infection by exchange of goggles and shields among the workers.

Effective methods for the control of all these hazards are known but their application has been "too late and not enough" in many instances. While it is true that the supply of protective and control equipment has not kept pace with the demand in some cases, other means for securing protection could have been devised. Frequently, insufficient measures have been taken to shield the arc and protect other workers in the vicinity from welding flash, or to remove toxic gases and fumes with local exhaust ventilation.

One of the serious results of the present war production drive is the inability of some industries to obtain the necessary protective equipment, such as rubber used in respiratory protective devices; fans, and motors employed in ventilating systems. This places a definite burden on the industrial hygienist and management, and will challenge the ingenuity of the engineers and chemists in devising makeshift protective devices.

OVERTIME AND FATIGUE: No discussion of the health hazards in the working environment would be complete without mentioning the factor of fatigue. Our knowledge of the effects of fatigue is scant and is not specifically applicable to the worker in industry. Even in Great Britain it was not determined exactly how much fatigue was due to the loss of sleep during the bombings last year and how much was due to work. Recent studies, however, indicate that the effects of fatigue, whatever their origin, and excessive hours of work result in lessened production, increased labor turnover, increased accidents, and increased absenteeism, or what is known as "fatigue hookey," and higher compensation costs.

Briefly, the physical manifestations of fatigue are ill health, accident proneness, and lessened efficiency at work. Unfavorable environmental factors, such as poor ventilation, excessive temperatures and humidity, noise, poor posture, friction with fellow workers and management, and home problems, have all been found to be more productive of fatigue than physical activity, unless the latter is in the heavy industries.

Associated closely with industrial fatigue is overtime. The key war industries are operating with relatively large amounts of overtime. The Bureau of Labor Statistics has shown that from two-thirds to three-fourths of the workers in such industries as shipbuilding, machine and accessory, munitions, and armament factories, are working overtime on an average of 10 to 12 hours a week. As our labor force increases, the number of shifts will increase, so that this problem will become less important.

Much has been said about the optimum number of hours of work to prevent undue fatigue. Studies both in Great Britain and in the country have shown that the optimum hours of work are 48 in a six-day week, and that for most industrial processes 40 or 44 hours per week are still better for sustained production in war industries. Opinion and experience both indicate that the optimum for women is lower than for men. Physiological limitations and domestic arrangements make it difficult for women to work more than eight hours a day. It would seem, taking all these factors into account, that the 40-hour week for women is more nearly the optimum.

One of the problems caused by the three-shift day has been the disruption in eating and sleeping habits of the worker. In an attempt to overcome fatigue, relieve traffic congestion, and still maintain all-around activity, some of the plants in this country are experimenting with what is known as the "Gray" plan of shifts. The plan is based on a progressive rotation system of four shifts on a 32-hour cycle and a 168-hour week. A man works eight hours and is off 24 hours. In other words, he works one day from 8:00 to 4:00, the next day from 4:00 to 12:00, and the third day from 12:00 to 8:00. This schedule is repeated indefinitely without change. The shifts may change at midnight, 8:00 A.M., and 4:00 P.M., or start at noon, 8:00 A.M., and 4:00 P.M. The workers are off duty at least half of the daylight every day and have desirable sleeping time every night. No man works over eight hours in any calendar day or consecutive 32 hours. The system provides exactly the same conditions for all workers; it eliminates long shifts, short periods off, weekly changes of shift, and disruption of sleeping and eating habits.

Both in Great Britain and in this country, experience has definitely indicated that where much overtime is worked, especially in those industries which for a while had to work seven days a week, production is not necessarily increased. As a matter of fact, the situation may be summed up by stating that working seven days actually means six days' production with eight days' pay.

Many measures have been suggested to offset the

effects of fatigue. The basic method of control lies in the physical fitness of the worker. Contributory factors are proper adjustment of hours of employment, improvement of the working environment, job simplification, standardization of machinery, elimination of lost motion, elimination of crowding in factories, reduction of noise, provision of rest periods, and improvement of industrial morale.

Improved nutrition has also been considered as a factor contributing to the prevention of fatigue. Nutrition is a factor to be considered not only in combatting fatigue, but also in the general health of the worker. Up to now industry has paid little attention to the eating habits of the workers. Even some of our new plants have made no provision for cafeterias and lunchrooms, or supervision of the worker's diet. In Britain a legal order was passed in May, 1940, requiring all factories employing 250 persons or more to establish a canteen on the grounds where the workers could purchase hot meals. Plants in this country which operate on night shifts are finding it imperative to make some provision for obtaining hot and inexpensive meals.

The research that is now being conducted by the Subcommittee on Nutrition in Industry of the National Research Council should result in factual data on this problem. The Subcommittee has already set up certain standards and its work may ultimately throw some light on the effects of improved nutrition upon absenteeism, accidents, and production.

Summary and Conclusions

I HAVE briefly outlined various problems confronting the industrial hygienist in our war industries. These problems result in part from the community environment in which many of our war workers now find themselves, and in part from the very character of the labor force now being mobilized in our war industries.

And so I have given major emphasis to the problems which result from the working environment itself, and which are the chief concern of the plant physician and engineer. In addition to the many old problems which are always with us, and which are now aggravated because of increased production, and other factors, there are also the new hazards arising from the use of old and new toxic materials and processes.

The answer to it all would appear to be in organizing adequate industrial hygiene preventive measures and maintaining the utmost vigilance. Medical, engineering, and safety personnel must constantly be aware of these problems. More than this, they must bring new problems to the attention of management and supervisory personnel lest the pressure for high speed production cause them to neglect the health and safety of workers and to discount the importance of conserving our vital manpower.

We should also utilize the worker himself in doing everything possible to maintain his physical and mental fitness so as to lessen the burden on the industrial hygienist. The management labor committees organized in war plants by the War Production Board should be a valuable channel for the dissemination of health information and for voluntary acceptance of industrial hygiene practices.

At this point, I should like to urge that you utilize to the fullest extent the services in industrial hygiene which can be given to you by the state and local industrial hygiene units, which may now be found in practically every industrial state in the Union. The facilities of these units, and our own Division of Industrial Hygiene of the National Institute of Health, are at your disposal and command.

If time is short for the production of war material, then there is no time to lose in conserving every ounce of energy and efficiency of our workers. There is an urgency, as well as a vital significance, to the life of the nation in the wartime tasks of the industrial hygienist.

The Humm-Wadsworth Temperament Scale

—In Job Placement at Lockheed-Vega—

F. E. POOLE, M.D.,
Medical Director, Lockheed-Vega
Los Angeles, California

BY WAY of explanation I shall make it clear at the beginning that I am not a psychologist and consequently cannot speak as an authority on the subject of psychological tests nor the relative merits or finer points of the various available tests. However, as medical director of a company where such a testing program has been in operation for some time, and as one who has viewed it from a detached position, I believe I have been able to form an unbiased opinion of its results. I have seen what appeared to be successful predictions or analyses as well as failures, and I believe that, in having the average physician's skepticism of new ideas and panaceas, I have tended to be conservative rather than enthusiastic in my opinions about the Humm-Wadsworth test.

Mr. Irwin, the industrial relations director, who is primarily responsible for introducing the testing program to Lockheed, had planned to be present at this meeting but was kept away by other engagements.

In 1937 Lockheed found that hardly two out of three new employees developed into satisfactory workers. Many beginners were unable to adjust themselves to the team method of making airplanes. They were too fast or too slow, or they could not get along with other members or the leader of the small highly coordinated teams. Many of these beginners quit or were terminated.

Lockheed decided that the time to solve these problems was before the workers were hired. Although employers had been testing their workers for skills and aptitudes, intelligence, and health, many still quit or were fired, and it was determined that 80% of the misfits were due to temperamental maladjustment.

Therefore a testing program was devised that would supplement the regular interview and selection practice by providing the interviewer with objective tests to aid his personal judgment. The new procedure was designed to help in the selection of employees who could fill certain requirements of intelligence, mechanical aptitude, *and* temperament.

The usual Otis I.Q. test and the mechanical aptitude tests have been fairly well accepted and standardized for some time and are used by the company as part of the pre-employment testing program. But these tests could in no way predict whether the individual with mechanical genius was so temperamentally adjusted that he would do his best work alone or as a member of a group; whether he would be a good leader or only a good follower; whether he would early become bored and disinterested in a repetitive job; or whether he disliked change and would get along best in such a job.

These tests also did not predict whether a person had creative instinct or whether he completely lacked imagination; whether he was lazy and content to do as little as possible; or whether he was ambitious and anxious to learn new jobs.

The answers to these questions are, of course, of very practical importance to the personnel whose duty it is to hire, place, and subsequently direct or supervise an employee. For instance, where coordinated group activity is needed, the individual with the trait of stubbornness, or the day-dreamer who lacks concentration, or the restless manic individual who is always two jumps ahead of everyone else would tend to disrupt smooth and efficient operation. It may be better in such instances to pick the moderately intelligent, easy-going, good-natured, easily directed individual who is not too imaginative, hard-driving, or ambitious. From a practical safety standpoint, also, it is better to place the dreamy creative individual on a drawing board than on the drop hammers where one might find him during his lunch hour experimenting on how to crack his hard boiled egg with a two-ton weight.

The ability to predict behavior, then, must be based on a knowledge of the factors that go to make up a person's disposition or temperament. Let us distinguish between the terms "personality" and "temperament." Personality includes the factors of skill, intelligence, personal appearance, stature, etc., while temperament reveals the individual's tendencies in his reactions to his surroundings, or, in short, his habits of behavior.

If a person usually responds in the same manner to a given situation, he is said to be in possession of a trait. Since habit making is strong in everyone, we all have an abundance of traits, which taken together make up our disposition or temperament. Some are the result of inheritence, some the result of experience. These traits tend to occur in groups. If a person is highly excitable, he is likely to be emotional, overactive, and possessed of poor powers of concentration. Or if he is shy, he is also likely to be a day-dreamer, impractical, and possessed of odd ways of doing things, called mannerisms. These groups of traits are called components of temperament, and the important ones may be stated very simply as (1) self-control, (2) self-interest, (3) emotion (manic-depressive), (4) imagination, (5) inspiration.

Of course, this list is a mere skeleton and each component has many traits associated with it. Bear in mind that every one of us has all of the components in some degree, and that the differences in individuals are due to the fact that in any given person one or two of the components may be dominant. Any component may be either a help or a handicap, depending on how well it is used.

LET US then consider these components individually and the traits that are involved in each; and try to visualize the variation of temperament that results when the components are very strongly manifest, normally present, or very weakly displayed.

SELF-CONTROL: A person with an excessive amount of this component finds a great deal of pleasure in ruling himself, self-discipline, and in governing his emotions, desires, and urges. He is so over-controlled he is dull and uninteresting. His conservatism paralyzes his own progress. He is too cautious, never lets himself go, feels ashamed when he comes near to, and is called a stick-in-the-mud. In him no other component has a chance to show itself, for he subjugates everything. Such excessive restraint is undesirable.

A strong degree of self-control, however, is desirable to make one steady and dependable and to give tact, poise, and self-restraint. Such a person does not go to pieces under fire and at the same time has sparkle by reason of the fact that he can control some of his other dominant traits. He preserves a rational balance, loosens up a bit, but doesn't get into trouble as a result of it.

Of course a person at the opposite extreme with little or no self-control gives way easily under stress and gets into trouble. If emotional, he may fly off into a temper; if imaginative, he may give way to feelings of abuse. He is frequently fired, frequently in fights, or frequently issues an invitation to trouble and has it accepted.

SELF-INTEREST: Self-preservation is said to be the first law of nature. Such an emphasis on self-preservation is likely to result in selfishness and in a lack of consideration for others, strong enough at times to result in anti-social tendencies. The person who is out to get what is coming to him at any cost may range from the professional crook down to the professional pauper. Such persons lack in real friends, and although they may be surrounded by cronies of their same kind, even with them they are untrustworthy and given to the "doublecross." They care little or nothing what they do to others, have a low code of behavior, and think others do too. They admire smart trickiness; cruel and humiliating practical jokes. Their motto is "something for nothing."

The quality of self-interest when well controlled may result in a hard driving individual who is strongly self-protective; a sharp trader; a good hand at getting what is coming to him; letting the other fellow take care of himself, but at the same time not inclined to cheat; excessively loyal to family and friends. He realizes that the needs of self-interest are best served by living up to the rules of the game.

The average quality of self-interest, fortunately seen in the majority of social beings, is one described by the Golden Rule. It is not necessary for such an individual to stop and think whether he is taking advantage of someone. He normally considers the other fellow as well as himself, but is not without selfish interests and not incapable of taking care of himself. He believes in fair play and is known as one to hold up his end of a deal.

The extreme negative quality of self-interest is, of course, seen in individuals with a martyr complex, who seriously engage in self-sacrifice to the neglect of their own interests and those who depend on them.

EMOTION (manic-depressive): The manic individual is happy go lucky, devil-may-care, always ready for anything, hopeful, self-confident, versatile, and picturesque, but quite likely distractable, overbearing, arbitrary, impatient, and even insolent. He is a good mixer but also easily offended and hot-headed. When

angered he has poor control. He lacks perseverance, and consequently seeks changing interests. He takes up many things often enthusiastically, but finishes few.

The negative or weak side of this component is shown by lack of ambition to things around him; extreme indifference. The tendencies associated with the depressed phase are crossness, grouchiness, anger, sadness, worry, and anxiety. Such persons lack confidence; suffer despair. To them life is a burden, and any task a mountain. They often have a timidity that makes it hard for them to make up their mind, so they spend a lot of time seeking needless advice and wondering what to do without coming to a conclusion. When a decision is made or an act done they feel uncertain about it.

IMAGINATION: Imagination sometimes becomes so strong as to result in a day-dream life so filled with wish-fullfillment thinking that the individual escapes partially from reality. Such an individual is called an introvert, from the habit of turning his thoughts inward rather than outward toward the world about him, and the effect is to make him impractical. This in turn shows him up in an unfavorable light to others, and he becomes aware that his thoughts expose him to ridicule. If he is not naturally aggressive, he becomes shy and retiring. Such a person is said to be autistic (day-dreamy).

On the other hand, if he is aggressive, he is likely to appear conceited, to carry a chip on his shoulder, and to hold himself better than those around him. We say such an individual is paranoid.

The extreme autistic is branded as being queer, unsociable, very idealistic, and impractical. He gets lost in theory and speculation, and neglects application or proof.

However, in a moderate degree this quality when controlled may result in an asset rather than a liability, and make it possible for him to be an inventor, musician, artist, or a person in whom controlled ideation is a servant.

The individual who is very weak in this component may seem totally lacking in imagination, and be unable to picture things in his mind's eye or foresee the possible outcomes of his actions.

The person with a strong paranoid quality may be so fixed in his ideas that he cannot be made to see his mistakes. He will be called hard-headed, stubborn, prejudiced, bitter, and revengeful.

Again, in a moderate degree and under self-control, these qualities may be assets where stubbornness, combativeness, and confidence in one's own judgment are necessary, or when he espouses a cause that meets resistance.

However, the individual very weak in this component is too easily influenced, for he lets others do his thinking for him. He follows the line of those nearest him, and has no confidence in himself.

INSPIRATION: In its most marked degree this component is seen as the basis of the lives of great religious leaders or scientists who devote their entire existence to the subject of their inspiration. They are ordinarily placid, matter of fact, plodding, single-minded, deliberate, orderly, and work endlessly with great pains.

Some excellent workers have this as the strongest component in their make up. They are recognized by their fondness for projects which they work on assiduously, by their placidity, occasional vividness of ideas, single-mindedness, and matter of fact attitude to their surroundings.

The total lack of inspiration does not signify lack of imagination or planning.

You will notice that as we have discussed these components of temperament we have in effect drawn a chart or graph on which can be plotted the degrees to which any one of the components is present in an individual; and that a person trained in the study or observation of such a chart could form a fair opinion of the temperament traits of the individual, just as the doctor forms an opinion of the progress or status of his medical or surgical case by observing the temperature and pulse graph.

Self-Control	Self-Interest	Emotion: Manic-Depressive	Imagination: Autistic-Paranoid	Inspiration

The trick, of course, (and a good one if you can do it) would be to devise a measuring stick for these various traits. Humm and Wadsworth believe they were able to do so.

THEIR TEST consists of a series of 318 questions which are answered by "yes" or "no." These, each, have weighted values for one or more of the components, which, added up, give for each component a value somewhere on the scale between the excessive and the weak manifestations. The resultant graph is studied by a trained analyst. No one of the components is judged by itself, but rather in its inter-relationship to the others.

The graph can be graded in some convenient way, as 1—2—3—4—5, or good, fair, borderline, or bad, with such added comments as "watch placement," "needs supervision," etc.

Naturally the test is not valid in all cases. For instance, a person may try to give the answers he thinks are wanted, or have a tendency to answer "yes" or "no" to everything. This results in an invalid test which is not scored.

It may be possible later to reduce the test to statistical values for easier analysis, but at present I wish to emphasize that the results of the test must be carefully analyzed by someone trained in psychology, and as such it is valuable in the hands of an interviewer who can then more intelligently interview an applicant or employee. At present it should be used as a guide to the better understanding and prediction of behavior, so that intelligent placement may be made for proper psychological adjustment—just as a physical examination is made primarily for the intelligent placement of an individual on a job commensurate with his physical abilities.

I hold no brief for this particular test, and will not enter into an argument from the psychologists' standpoint by picking the test to pieces to criticize it point by point. The question is whether or not as a whole it has done the job expected of it. We must say that in a majority of cases it shows a high degree of correlation and verification and has been a fairly good measure for the prediction of temperament and behavior. As such it has been used as an aid in job placement initially and during the employee's active progress in the company in job counseling by the plant personnel representatives.

SINCE 1937 Lockheed has tested almost 300,000 applicants. The company seldom hires a man or woman even in executive capacity without first giving the test. Nearly every time an applicant has been employed in spite of adverse test results, the company has regretted it.

Lockheed, in the face of national emergency, has had to fill many highly skilled jobs with men of undesirable temperament. It is not surprising, then, to know that two out of every three workers that the company had to terminate in 1941 had shown adverse test results. Yet the rate of turnover for Lockheed is substantially less than for the industry average.

Well balanced employees get along well together and readily adapt themselves to the pressure of the present emergency. Labor trouble has always been at a virtual minimum. Lockheed's production per man is also well above that for the industry.

Someone will ask, "How do you know that those eliminated by the test may not have been as good as those taken?" We expect to get a better answer to that this year, for in many occupations men are being hired without regard to the test results; and we expect to start an extensive statistical survey and criteria study to evaluate the tests of all who have been employed. We expect that a correlation of the test results with the employee's record and job performance will aid materially in the further application of the test. Undoubtedly it can be improved, and, if so, we wish to do it before our inevitable cutting down process starts; for we feel that if the test is of value in initial placement, it can be of much more value as a guide in counseling an employee during his course of employment. And later, when reduction is necessary, it may be of as much value in helping to decide whom to let go as it was in deciding whom to hire.

SUMMARY: The ability to predict temperament or behavior may be of considerable importance in the intelligent placement of an individual on a job. Therefore, any test that might act as a good measure of temperament could be of considerable value as a supplement to the regular interview and selection practice by supplying the interviewer with an objective test to aid his personal judgment.

Such a test (the Humm-Wadsworth Temperament Scale) has been used by Lockheed and Vega for this purpose with apparent good results.

[NOTE: The Humm-Wadsworth test is copyrighted and owned by Doncaster G. Humm, 1213 3rd Avenue, Los Angeles, California, who reserves the right to sell the test and license individuals to administer it. Detailed information relative to its cost and application may be obtained by contacting Dr. Humm.]

Maintenance of Health

—In the Management Group—

MARTIN I. HALL, M.D.,
Medical Director, New Departure Division, General Motors Corporation

DURING the past decade there has been a significant and changing concept of industrial medical activity, namely the advance from the limited field of care of the injured and industrial accident and disease prevention to that broader field of general health promotion and health education in the employed groups. It has been recognized by employers and employees alike that this broader field of health preservation, a separate and distinct undertaking, is not only humanitarian[1] but also practical, and an asset to business, to the individual, and to the community. By means of the varied physical examinations and medical consultations adopted by many industries the employee has been assured of proper and safe placement and, at the same time, his general health has been promoted. In a controlled study by Moore[2] in which half of an employee group had periodic physical examinations there was found to be a definite decrease in the sickness frequency of this group as compared with those employees in the group not examined. Similarly, some of our insurance companies who report their findings after many years' work in promoting health among their employees and policyholders conclude that their results in promoting health are both measurable and favorable.[3, 4]

One may justly conclude from these and numerous similar reports that such health services have proved their worth a hundred times over, and that the keystone to these successes has been the health examination of and the medical conference with the employed groups. In other words, by physical examination and by consultation the industrial physician brought to the employee's attention certain morbid physical and mental conditions and unhealthful practices which he was not aware of, or, if aware of them, he was indifferent through lack of education and understanding of healthful practices.

Such health maintenance programs are being adapted to specialized groups within many of our business establishments, and the management group

should prove to be no exception, for who should be more familiar with the necessity of periodic inventory and audit than the executives themselves? This is the group comprising the key men in the industrial world, men who are most difficult to replace, men upon whose judgment and experience the company, the community, and the nation depend. Again, here is a group, which represents probably the most significant period of human life from the point of view of senescence.[5]

In general terms, a program for the maintenance of health in the management group aims to make life happier and more effective. This can be accomplished, (1) through development among them of a sound and sympathetic attitude toward scientific health practices; (2) through the early detection and control of abnormal physical and mental conditions prior to their recognition by the individual as a cause of pain or disability; and (3) by influencing this group's conduct, individually or collectively, in a manner favorable to healthful living.

How can the industrial physicians best promote such a program of health maintenance in this executive group? Being fundamentally health educators the industrial physicians are in an enviable and strong position to foster what could be called "executive preventive medicine." Enviable because of their intimate daily contact with this group and strong because they command the respect of the executives, and unless they do command this respect the medical service is hardly adequate for the employee population.

There is no one rule of thumb or universally applicable plan that will adequately promote better health practices within any group, but certain broad principles may be considered which when applied intelligently will bring helpful information to this group collectively or individually.

Publicity

LECTURES, pamphlets, and health topics in plant publications,[6] have their place and play a most important part in the general campaign of information, but they carry conviction to only very few of those reached. The reason is that they are not personal, appropriate, or definitely desired. The general attitude is that such general information is meant for "the other fellow." However, by proper selection and attractive presentation of specific subjects more interest in matters pertaining to health can be stimulated. Many subjects involving common health problems are adaptable to our plant publications, and each regular issue should contain a brief yet interesting topic discussing some personal health problem. In general, the subject matter should stress the fact that the way we live influences our health. Dissertations or essays on pathology and therapeutics and symptomatology are to be avoided—these are in the realm of medical education, not health education. Specifically, the purpose of these health topics is to influence the layman's attitude toward his personal health problems in such a manner that he will have better understanding of the dangers of self-diagnosis, self-treatment, patent medicines, and quackery; also, that diet, play, work and rest influence health and happiness; and, finally, that periodic health examinations at frequent intervals and immediate medical consultation at the first sign of illness are essential if a full life is to be enjoyed.

The Periodic Examination and Medical Consultation

THE periodic physical examination repeated at suitable intervals according to age and physical findings and the medical consultation are the best means we have of assuring the layman of early diagnosis of incipient disease and also of instructing him in sound health practices.

If each one of this group has the physician's attention for at least an hour and at least once a year to bring to his notice all significant defects found and to inform him of necessary corrective measures, he will then have a truer picture of his personal health problem. The defect found may be of relatively minor import, such as faulty dentition, faulty vision, some faulty living habit, and the like, but he will be getting first-hand, scientific, unbiased information—in other words true health education. By these means his interest will be stimulated and the fear of medical examination and consultation dispelled; he will soon learn the dangers of self-diagnosis and self-treatment; he will welcome the opportunity to return for his periodic health audit at stated intervals; and, finally, he will learn what profits may be realized when the advice of his physician is sought early in the course of disease.

The health examination should be systematic and deliberate, yet not so extensive as to tire the examinee. It should be not unlike the procedure used in any systematic examination of a new patient consulting about a sickness, although the point of view is entirely different. In the first instance the patient seeks advice and relief because of sickness, whereas the health examination is intended to interpret for the patient certain sub-clinical signs and symptoms that may indicate significant early disease and to advise him in the laws of good personal hygiene. In general, then, the examination should consist of the practitioner's own system and procedure of examination, and the use of one or more simple laboratory tests are indicated routinely. Should the findings warrant further investigation then further laboratory or instrumental tests should be carried out. Similarly, repeated specialized investigations may become necessary before diagnosis can be made.

Other than the illnesses to which any of us may be subjected, the disorders more commonly found and of singular importance in this particular age-group of individuals are those of organic deterioration—cardiovascular-renal disorders, arthritis, diabetes mellitus, all forms of cancer, neuropsychological problems, the climacteric, and the like. Though progressive, much can be accomplished through early discovery followed by medical supervision of these morbid states to prevent or alleviate unnecessary sickness, invalidism or crippling, and even death may be forestalled from five to 20 years.

After completing the examination the physician should reveal to his client or patient all significant findings. He interprets the diagnosis for him in lay terms and discusses with him the corrections and supervision required if any are indicated. For the patient this discussion should be "an experience in health education, a personal post-graduate process of training in observance of the laws of right living; for the physician an opportunity to guide his patient around disease instead of watching him and treating him while passing through sickness."[7]

Is this health promotion plan for the management group a part of the industrial physician's responsibility? It most certainly is! Will it interfere with the individual's relation with his personal physician? Not in the least! Rather it tends to promote a health consciousness and a definite desire to report at frequent intervals to his personal physician for health supervision and for early management in case of sickness. Dr. C. D. Selby has repeatedly asserted that industry is not in the business of practicing medicine but is

interested and willing to assist in avoiding ordinary sickness.[8] A program such as I have outlined is aimed at those in the group who for one reason or another have failed to avail themselves of the opportunities offered by modern preventive medicine. The industrial physician can and should attempt to influence them in these matters concerning healthful living by promoting some plan of health education and examination such as has been outlined.

In conclusion, I wish to emphasize that the success of such a service will be jeopardized unless the cooperative efforts of the industrial physician, the patient, and his personal physician are maintained. They must act always as a team and supplement each others efforts if the health of this group is to be kept at its highest possible level. With a little forethought and imagination a plan can be adapted to the needs of any business establishment and, if ably executed, the results will be most gratifying. Success may be claimed when each member of this group reports at stated intervals to his personal physician for health examinations.

References

1. J. M. CONWAY: Humanitarian Appeal and Industrial Health. *Indust. Med.*, 9:12, December, 1940.
2. D. A. MOORE: The Employee. *Indust. Med.*, 9:12, December, 1940.
3. Report of the Medical Rest Room, Metropolitan Life Ins. Co., 1939.
4. EMERSON and BRANDON: A Physical Fitness Service. *Indust. Med.*, 4:1, January, 1941.
5. E. J. STIEGLITZ: Aging as an Industrial Health Problem. *J. A. M. A.* 116:13, March 29, 1941.
6. N. E. ECKELBERRY: Training in Health, *National Safety News*, December, 1941.
7. HAVEN EMERSON: Periodic Health Examination. Nelson Loose-Leaf Medicine, Vol. 7.
8. C. D. SELBY: A Program for the Maintenance of Employee Health. Read before AC Spark Plug "Open House," April 4, 1939.

X-Ray Protection

M. B. EVANS, JR.,
Supervisor of Industrial X-Ray, Ternstedt Division, General Motors Corporation

TO BEGIN a discussion of x-ray protection is to start discussing something which is an unknown, and then trying to figure out how to protect oneself from it. X, as in a mathematical equation, is the unknown, and so is x-ray as the name implies.

First, then, let us see how much we know of this unknown, and from the limited knowledge, establish protection standards.

Beginning with the cosmic radiation, the radiation spectrum progresses through radium radiation, x-radiation, through an unknown area into the far then near ultra-violet, then the visible area, infra-red, and so on through ham short wave, short wave radio and diathermy, and broadcast radio on up to an uninvestigated end somewhere.

Notably, no filter has been found for the cosmic ray. Tests have shown that it will discharge an electroscope deep into mountain caves as well as in heavily lead-lined rooms. Radium, as second, penetrates through unusually large thicknesses of metal. Then comes x-ray, and here a lot of the penetrability of the radiation has been investigated and methods of its control perfected.

The next step in getting acquainted with an unknown would be to determine how it is produced. X-ray is produced when fast moving electrons are suddenly stopped. Thus, an x-ray generator consists of a source of electrons, a means of accelerating these electrons to a high speed, and a means of stopping them suddenly.

The first and third of these requirements are found in the x-ray tube, the filament being a source of electrons, and the target or anode being the means of suddenly stopping them. The middle requirement is found in the high tension generator. Thus the actual x-ray generator is the tube, and the high tension generator merely a means to an end. Naturally, some means of controlling this action must be had, and for this purpose there is a filament regulator in the primary side of the filament transformer and an autotransformer or constant-voltage device in the primary of the high tension transformer.

It is not my place to go into details of the effects of radiation on the human body. However, I would like to mention the following:

Constant exposure of the human body to x-rays is injurious to health. For this reason it is necessary to protect operators and others who may be working in the vicinity from radiations.

Dangers from x-ray radiations are of two sorts, *local* and *systemic*. The local effects of radiation manifest themselves first as a reddening of the skin near the nails of the fingers which receive the greatest exposure. Later the nails become brittle and tend to crack; the skin at the ends of the index finger and thumb (and possibly others) becomes thick and leathery. Some pain is present, particularly on exposure to heat or cold. Cuts and scratches do not heal well. Warty growths appear, which may become ulcerated and infected, and which may eventually degenerate into cancer.

The appearance of the earliest of these changes should be a warning. It is probable that the development of a slightly red and shiny appearance of the skin at the nails after several months of work need not require immediate cessation of the usual exposure. It should, however, be an indication for added precautions, unless the experiment in hand is almost completed and further irradiation is not contemplated for some time. The presence or absence of local effect on the fingers is not a criterion of whether the safe total body dose is exceeded. A careless operator may experience skin changes when the body dose is completely safe.

On the other hand, a careful and skillful manipulator may show no skin changes, although his general protection is insufficient.

The first symptoms of general or systemic injury due to over-exposure are a lowered vitality, with a general feeling of lassitude, and frequent headaches. If the exposure continues, sterility may be produced,

and also changes in the blood picture, which later may progress to fatal anemia or leukemia. The amount of whole body radiation which can be tolerated without evidence of injury is not known. The basis of the following is from the experiences of large institutions using high voltage x-ray.

Checks on the blood count are generally advised, for radiation workers. It is always desirable to have one count (or preferably two or three) made before radiation work is commenced, and others at intervals subsequently. When practicable, they should be made by the technician, at the same time of day, and employing the same methods. Normal fluctuations in both red and white cell counts are considerable. However, a steady downward trend in either is a danger signal. If it is felt that undesirable changes are occurring, blood counts should be closely watched by a physician with experience in such matters.

It is always advisable to test the protection for any specific locality, or for an individual working in the neighborhood of radium or x-ray preparations. Although an effort has been made to comply with safety requirements, it is difficult to be certain that there are no unsuspected leaks. Convenient ionization instruments for making such tests are on the market, the most commonly used being the Victoreen. They should not indicate ionization corresponding to more than one roentgen in a week.

Physicists attached to local hospitals are available to make roentgen calibrations.

A roentgen is that quantity of x-radiation which when passed through 1 cc. of air at 0°C and 760 mm. mercury pressure (.00129 grams) produces a saturation current sufficient to produce one electrostatic unit of electricity (10-9 amperes) when all secondary electrons are utilized and when the wall effect of the measuring chamber is excluded.

If such an instrument is not available, photographic films may be fixed in various positions in the laboratory and carried by the personnel. Ordinary dental x-ray films are satisfactory; it is advisable to put a paper clip across the film packet. If the film, developed after two weks of exposure is decidedly dark it is an indication of an undesirable amount of radiation. If the region under the clip is not dark, the radiation effective was quite soft, possibly beta-rays. If the film in question was worn or carried by someone, his activities should be checked to see that he is not getting too much local effect in some manipulation. It is a good idea for an active operator to carry several films in different packets, at different body levels, and in the rear as well as front. If after a week of exposure and standard development, none of the films is so dark that, when it is put on a printed page in good light, the letters cannot be distinguished through it, then protection is adequate. If a film from one part of the body is much darker than from the others, it is certain that local exposure has occurred. This may not mean that general protection is inadequate, but it calls for investigation.

Protection

PROTECTION is effected in three ways—first, the source of radiation may be confined within a suitably protected room; second, absorbing screens may be placed around the work so as to intercept the radiation, and workers may be kept at a sufficient distance to protect them from any secondary radiation; and third, no attempt is made to absorb stray radiation but exposures are made at times when no workmen are in the vicinity.

When the source of x-rays is confined to a room, protection is secured by lining the room with lead or making the walls of a material that will have absorbing power.

The table gives thickness of lead necessary for adequate protection as prescribed by the International Commission on X-ray and Radium Protection.

X-Rays Generated by Peak Voltages not in Excess of	Recommended Minimum Lead Thickness —MM.	Wt. of Barrier Lb./Ft.^{2}
75 Kv	1.0	2.4
100 Kv	1.5	3.5
150 Kv	2.5	5.9
200 Kv	4.0	9.5
225 Kv	5.0	14.0
300 Kv	9.0	21.0
400 Kv	15.0	35.0
500 Kv	22.0	52.0
600 Kv	34.0	80.0

The tolerance dose recommended by the International Protection Commission is taken as a seven-hour daily exposure at a dosage rate not exceeding 10^{-5} roentgens per second. This is roughly 10^{-4} times the dosage rate of cosmic radiation.

It is argued by the geneticists, that this is 10 times the safe dosage; or in other words the tolerance dosage rate, should not exceed 10^{-6} r./sec. Their figure is based on the elimination of any second generation genetic effects, whereas the accepted figure of 10^{-5} r./sec. is based on the effect upon the recipient of the radiation only. Although genetic effects were not a consideration during the preparation of the international safety recommendations, it is possible that such a wide margin of safety has been provided that they have hitherto successfully protected against genetic mutations.

The protective lead thicknesses given in the above table are self-consistent in that they all give the thickness of lead required to reduce the beam produced at any given voltage by approximately the same amount.

It is likewise further found that the internationally accepted protective lead thicknesses all apply to an initial dosage rate of 3 roentgens per minute at 150 cm. from the target. In other words, an incident dosage rate of 3 r./min. at a given voltage, will be reduced to 10^{-5} r./sec. in passing through the corresponding lead barrier.

Because of the high cost of lead protection, use of other materials such as concrete or brick has been resorted to with some success. Also, concretes "loaded" with barium sand, iron filings or iron ore have been used. However, it is important to emphasize that a lead barrier will provide the lightest installation per given degree of protection (within the voltage range of 50-600 K. V.). Any of these substitutes will be from two to 20 times heavier, but this higher load may be offset by the concrete or brick having definite structural value and thus provide economies in general building construction.

No exact data are available as to the lead equivalent of concrete, but in some installations 24 inches of concrete are used to protect against radiation from a 400 K.V. tube. Tests on brick have given values of .01″ of lead per inch of brick for ordinary brick, and .008″ per inch of silica brick.

There is thus the choice of making a thin wall of dense "loaded" material or a thicker wall of standard unloaded material. The important feature about concrete protective barriers is that their protective effi-

ciency, with respect to lead, increases with both voltage and thickness in the range above 200 K.V.

The table below gives the approximate lead equivalents of concrete for the conditions imposed by the international protection recommendations.

Potential K.V.	Recommended Lead MM.	Concrete Equivalent MM.
100	1.5	120
200	4.0	220
300	9.0	240
400	15.0	260
600	34.0	300
1000	86.0	460

(A) From KAYE, BENKS and BELL—100 mm. applies to 3 grams of radium at a distance of 100 cm.

Where x-ray tubes are used in the open shop, even though lead screens are placed around the work, there are some stray radiations. It is important that the operator be provided with a well-protected enclosure.

It should be remembered that protection is necessary not only for the direct beam, but also for the scattered radiation. It is not sufficient simply to interpose a lead screen between the x-ray and the workers in its vicinity. Such a screen might eliminate all the direct radiation, and yet a dangerous dose be scattered back into the room from the walls and floor. The x-rays must be sufficiently enclosed on all sides or else workers must remain at such distance that the minimum path for scattered radiation (or rather, the total distance from the source to the scattering wall and back to the worker) is as great as the safe distance with no extra filter.

In speaking of safe distances, a general formula for determination of those distances would depend on the inverse square law. X-ray, like all forms of radiation follows this law, which, in effect, states that the intensity varies inversely as the square of the distance. Thus, there is four times as much radiation one foot from an x-ray source as there is two feet from the same source.

Inasmuch as all of the new high-voltage equipment on the market is shockproof, we will not go into the problem of electrical protection except to say that 200,000 volts is a lot of voltage, and that all care should be taken to make sure that only shockproof equipment is used. Particularly, the ground connections of all x-ray machinery should be periodically inspected by the maintenance men.

X-ray dark rooms in particular should have some means of air conditioning. Fumes from the developing chemicals are obnoxious and very easily produce a dank atmosphere which is not in keeping with good working conditions. It is further suggested that a positive air pressure be maintained on the dark room, both for the advantageous air change, and to keep normal factory dust from coming in.

The following general rules for the physician in charge should be adhered to:

The efficiency of x-ray protection and protective devices shall be examined upon installation and yearly thereafter. This shall be accomplished with a fluorescent screen fitting closely over the eyes. The detection of any fluorescence by the well, dark-adapted eye shall be considered a hazard and be remedied. A more efficient test, of course, would be the use of x-ray film as previously described. For the purpose of providing safety for the working personnel, it is recommended that such annual inspection of x-ray protection be conducted by an expert in such work.

At least every four months each worker shall be supplied with a dental x-ray film half covered with lead foil, which shall be worn on the breast continuously, with the film side out, for 15 working days. If, upon development, appreciable darkening of the exposed part of the film is indicated, the cause therefor shall be investigated and eliminated.

Circuit-breakers should be examined monthly to be certain that the overload adjustment is correct.

Personnel working conditions:

It is the duty of the physician in charge of an x-ray department to be responsible for the health and safety of all workers in so far as conditions permit.

Favorable working conditions shall include provision for workers of ample light and sunshine, fresh air, sufficient spare time and satisfactory protection.

All persons occupied in radiological work should be examined for general radiation injuries yearly. Complete blood counts should be made bimonthly. The results of all tests and examinations should be permanently recorded.

It is advisable that all persons be carefully examined before entering radiological work.

There is one further paragraph in the Bureau of Standards handbook which is not within my province to decide. This suggests that all x-ray technicians be given four weeks vacation annually, with two of these weeks consecutively.

References

Radium Protection. *Journal of Applied Physics*, September, 1939.

U. S. Department of Commerce. National Bureau of Standards. X-Ray Protection. N. B. S. Handbook No. HB-20.

The Control of Tuberculosis in Industry

—Management of the Employee with Pulmonary Tuberculosis—

GEORGE A. SHERMAN, M.D.,
Michigan State College

THE control of tuberculosis is a broad public health problem resting largely with practitioners of medicine, sanatorium directors, public health officials and voluntary tuberculosis associations. Finding the case is largely the responsibility of the practitioner of medicine, which, of course, includes the industrial physician.

Industrially employed individuals represent one of the important reservoirs of this disease, defined by the law of Michigan as "dangerous to the public health." L. D. Bristol,[1] Health Director, American Telephone and Telegraph Company, states that "it is the outstanding chronic disease which occurs among industrial workers and attacks all occupational groups."

A few years ago, the National Tuberculosis Association carried out some reliable studies on death rates from pulmonary tuberculosis, standardized according to age distribution of all gainfully employed males 15 to 64 years of age in 10 selected states. Their data were as follows:

	Rates per 100,000 Occupied Males
Professional men	26.2
Proprietors, managers and officials	43.2
Agricultural workers	46.5
Clerks and kindred workers	65.8
Skilled workers and foremen	72.1
Semi-skilled workers	102.1
Unskilled workers	184.9

The Metropolitan Life Insurance Company[2] has carried out a well organized case-finding program for pulmonary tuberculosis among applicants for employment since 1928. In 1939, they found the incidence of clinically significant tuberculosis to be 80 per 10,000, a figure which compared closely with the number of cases found in their applicants in 1930 when the program was first started. Much more evidence could be submitted to indicate that tuberculosis is a serious disease in industrial employee groups, but the physicians comprising this audience are already well convinced concerning this problem.

As to the interest, the most tangible evidence that a problem exists is seen in the amount of money expended by the divisions of General Motors in Michigan to detect disease of the chest. The following divisions are listed by Dr. Selby's[3] office as those now carrying out routine pre-employment x-ray of the chest.

Cadillac Motor Division, Detroit.
Fisher Plant No. 23, Detroit.
Ternstedt Manufacturing, Detroit.
A. C. Spark Plug Division, Flint.
Buick Motor Division, Flint.
Fisher Flint No. 1 Division, Flint.
Grand Rapids Stamping, Grand Rapids.
Olds Motor Works Division, Lansing.
Fisher Body Division, Lansing.
Fisher Body Division, Pontiac.
Saginaw Malleable Iron, Saginaw.
Chevrolet Grey Iron Foundry, Saginaw.

In addition to these, many thousands of x-rays of the chest are taken in divisions of General Motors not employing pre-employment x-ray procedure, but taking the films when the history or physical examination seems to suggest it.

The control of tuberculosis in industry means the adoption of some definite program for the management of the employee found to have evidence of pulmonary tuberculosis. Industrial physicians are demonstrating that, by methods which are simple and economical, pulmonary tuberculosis can be profitably controlled. Inasmuch as this program of control appears to be an individual problem for each industrial physician, it would seem well to study the administrative procedures that may be established within the plant for a successful management of this problem.

ADMINISTRATIVE procedures within the plant:

Adequate medical supervision depends upon adequate records and their maintenance. The history card should provide for any history of tuberculosis or antecedent pulmonary infection in the employee or his family.

Some index must be made use of to insure the necessary check-up examinations at acceptable intervals for those cases requiring observation. Stiff cards of suitable size have many advantages over typed material filed away in an envelope or folder. Cards lend themselves well to quick reference—flagging, colors, etc. Poor records result in (1) failure to follow through on the new case, and (2) failure to carry out periodic examinations for the known case. Tickler files have been found useful in many plants for the known case requiring periodic observation.

ROUTINE pre-employment x-ray examination of the chest:

Twelve divisions of General Motors in Michigan have already put into effect a pre-employment x-ray program. Apparently a number of medical directors have been carrying on with this program since 1936 or prior, and each year sees its adoption in other divisions of General Motors. It would seem that the trend is probably a sound one. Much evidence has now accumulated regarding the findings one might expect in such a program, but, so far as I know, the findings have not been made available. The experience reported by Metropolitan Life, of 80 cases of significant tuberculosis for every 10,000 new applicants, may be taken as a fair average finding. The introduction of the small film and the constant improvement in its quality by means of better films and better x-ray equipment are really making this procedure relatively simple and economical. The cost of the full-sized films is not prohibitive, and is still preferred by some of our best men. On the other hand, the recent development of the single emulsion film, and employing the use of a grid, has resulted in small films that leave little to be desired.

PERIODIC x-ray examination:

This might be suggested for the following groups:

1. Those with a family history of tuberculosis.
2. History of questionable antecedent pulmonary disease.
3. All ex-patients.
4. Apparently arrested stable disease (no history).
5. Rehires following respiratory illness.

INTERPRETATION of films:

Most medical directors interpret their own films, reserving for consultation those with some apparent abnormality. Any abnormality in a chest film is worthy of expert consultation. The local roentgenologist or regional sanatorium medical director should see all abnormal chest films.

CLASSIFICATION of findings:

A simple classification of positive findings into three groups has been found in many places to work well:

1. Apparently arrested cases—those individuals who have no signs or symptoms of pulmonary disease, and whose roentgenograms reveal lesions which have the characteristics we all associate with arrested disease, namely, calcification, fibrosis, etc. These lesions are of the reinfection type and a great majority of them are minimal in extent, but a small number will be moderately advanced, or even far advanced in extent.
2. Active cases—those individuals whose roentgenograms are considered characteristic of active tuberculosis and who, on re-examination, may be found to have symptoms or signs of disease. However, the group also includes those individuals without symptoms but having the characteristic x-ray appearance of active, exudative disease.
3. Questionably active—this group consists of those having an x-ray abnormality described as "soft," minimal in extent. The patient has no symptoms, signs or laboratory evidence of disease.

INTERVIEWING the employee:

Much of what has been accomplished up to this point may be nullified in part if one does not give some thought to this phase of the program. A note to the family physician is not a substitute for an interview. The family physician will play his part in this program, but the medical director cannot shirk his duty merely because it may be unpleasant. The following is suggested:

1. When no disease is found (including those with a few small calcifications), the employee should understand that a report is not indicated unless some abnormality is discovered.
2. Apparently arrested cases—following re-takes, supplementary studies (more history, examination and laboratory studies), and consultation with the roentgenologist, and the medical director is satisfied that the condition is apparently arrested, then the employee is entitled to a clear statement of the findings, together with specific recommendations for the future periodic re-checks.
3. The active cases (including "questionably active" requiring stoppage of work)—after the confirmatory

studies have been completed, the situation should be clearly explained to the employee. He may be referred to his family physician for observation at home, or sanatorium care should be arranged. The case should be reported to the Department of Health. This is essential to adequate control of tuberculosis. The *questionably active case* is one where a difference of opinion may exist. Many of these cases do well while at work provided that frequent x-ray observation is carried out, so that any beginning spread may be detected early and sanatorium care arranged. As a rule, however, an initial period of observation in the sanatorium is to be preferred. The question of activity can usually be established in three months' time.

The following illustrate some of these problems:

M. B., a 26 year old male was x-rayed November 5, 1936, at Fisher Body Division, Pontiac. He was one of four in the first 1000 employees routinely x-rayed at that division. This is an example of apparently arrested disease. No history of illness and no abnormal signs. He was followed while at work, and nine months later no change had taken place. It is admitted that there might be some difference of opinion regarding the stability of the disease.

G. M., a 30 year old male, was first x-rayed October 25, 1937. He was admitted to the sanatorium at once; a typical example of the active, moderately advanced case. The disease was controlled promptly by pneumothorax, and he returned to work in less than one year. He remains well. This is an excellent example of the results that may be obtained when industry and the sanatorium work together. The reason for allowing this man to return to work so promptly was the medical supervision available in the plant.

M. B., 33 years old, was first x-rayed November 5, 1936. He was admitted to the sanatorium one month later; an example of the questionably active case. He was discharged at the end of three months, but re-admitted nine months later, when the disease was controlled by pneumothorax. Final discharge was made three years following the first admission. This illustrates the well-known fact that the period of sanatorium care is frequently not determined by the amount of disease present. Finally, he was very suitable for return to his old job, but he left the state.

L. M., a 37 year old male, was first x-rayed August 1, 1935, as a contact. He denied all symptoms and refused treatment. There was very little change in three years, until the appearance of a small cavity on the film taken September 27, 1938. He was admitted September 26, 1928. Ineffectual pneumothorax but conversion of sputum. This illustrates a common example of the difficulty of persuading a man that he has a serious disease when he has no symptoms.

INTERVALS suggested for periodic re-examination:

The ex-patient: (1) X-ray and arrange for examination of sputum every three months for first two years, and (2) every six months thereafter for a period of five years. The contact (family history of exposure): (1) X-ray at once and every six months for three years; (2) once a year during the fourth and fifth year. Other miscellaneous groups (apparently arrested, no history of disease, rehires following respiratory illness): Interval dependent on history.

REHABILITATION:

Sixty-five to 75% of the minimal and moderately advanced cases can be expected to return to their former positions in industry after an adequate stay in a modern sanatorium. Not more than 35% of the far advanced will resume their old jobs. Increasing experience in industry leads to the conviction that the average employee who makes a good recovery can return to his old job or some similar job that the medical director can suggest for him. We are not concerned here with the man so severely handicapped that he must seek a new vocation. That responsibility is shared by the medical director of the sanatorium and the State Department of Rehabilitation. Those of us who have spent years in the sanatorium know that the greatest hope we can hold up to the man or woman taking the cure is to tell him that some day he will go back to the old job. The individual who has found a place for himself in industry has acquired a sense of security for the future. Prolonged illness, such as that associated with tuberculosis, tends to shatter much of this sense of security, but an additional nightmare is added when the individual is confronted with the necessity of finding employment in an entirely new field.

CRITERIA of when the patient may return:

Tuberculosis is characterized by an uncertainty in outlook that is associated with few other diseases. It is a chronic relapsing disease, involving the lungs primarily, but generalized in distribution in many cases. The extent of the disease, the absence of complications, the response to treatment, and the passage of time, are the principal factors that one considers in making a prognosis. This being so, the sanatorium director is the individual who must determine when it is probably safe for the individual to return to work. Most of the sanatorium men are in approximate agreement on this question. If one might speak of any trend, it might safely be said that an increasing number of men are willing to allow the minimal and the moderately advanced cases, who have responded well to treatment, to return to their work at a period earlier than was the custom 10 years ago. The reason for this change is the increasing faith in modern methods of therapy, and the knowledge that constant adequate supervision can be carried out when the man returns to his work. All of this is or should be explained to the individual before he returns to his job.

A. M., an 18 year old girl, was first x-rayed June 19, 1929, and far advanced bilateral disease found. She was admitted to the sanatorium 10 days later. A complete left thoracoplasty was carried out. She was discharged September 19, 1931, the disease controlled 27 months following admission. Dr. John Lambie found a place for her some time later. She has worked at her old job on the line for the past seven years or more. The disease was well controlled one year ago, and she is still very well. Every physician dealing with patients recovered from tuberculosis should have at least one such case in his collection to refresh his faith that the patient with far advanced pulmonary tuberculosis can be controlled, can return to work and remain well for many years, doing all of the things that some of our healthy women would shrink from attempting.

ADVANTAGES of a modern tuberculosis program:

To the industry, the experience of those companies who have had a tuberculosis control program for a period of years demonstrates clearly the advantages of such a program. In 1921, the Eastman Kodak Company[4] had 23 persons ill with tuberculosis in every 10,000 employees. In that year they put into effect one of the soundest programs in operation in the United States, and in 1940 they had an average of two cases in every 10,000 employees. The Metropolitan Life Insurance Company adopted a program of tuberculosis control in 1930, making use of routine pre-employment x-rays and their own sanatorium. In 1930 they had 40 cases of significant pulmonary tuberculosis in every 10,000 employees. In 1939 they had reduced this number to 10 cases in every 10,000 employees. At the same time, they make the statement that the amount of tuberculosis found in persons seeking employment had not been reduced in that period.

To the community, a program of tuberculosis control constitutes a great contribution to the public health

and social improvement of any community. It goes far in bringing about better "public relations."

To the worker, protection from one of the greatest threats to economic security needs no justification.

Summary

TUBERCULOSIS is the outstanding chronic disease which occurs among industrial workers, and attacks all occupational groups.

2. Tangible evidence is available that industry recognized the problem, and is prepared to deal with it.

3. Administrative procedures, properly planned, go far in the management of this problem.

4. Rehabilitation of the patient with pulmonary tuberculosis is a joint problem for the sanatorium director and the industrial physician.

5. Recognition of the relapsing nature of the disease necessitates a well-planned, periodic re-examination program.

6. The material advantages of such a program to industry are illustrated by the control of tuberculosis achieved by those industries with a well-planned, long range program.

Bibliography

1. BRISTOL, L. D.: Public Health Relationship of Tuberculosis in Industry, Saranac Laboratory Symposium, 1941.
2. REID, A. C.: The Control of Tuberculosis. *J. Indust. Hyg. & Tox.*, 23: 35-44, January, 1941.
3. Personal communication.
4. SAWYER, W. A.: Control of Tuberculosis—Administrative Procedures in the Plant. Saranac Laboratory Symposium, 1941.

Experiences with 4 x 5 Films

G. E. GUNDERSEN, M.D.,
Medical Director, Oldsmobile Division, General Motors Corporation

WE HAVE used 4 x 5 films for our chest work at the Oldsmobile Division since June, 1941, have taken 3290 films, and feel satisfied with the results.

For the benefit of those who are not familiar with fluorophotography let me state briefly that the unit consists of a truncated box with a special 14 x 17 curved screen of the calcium sulfide type and lead glass filter at the large end, and a camera with a six-inch fixed focus, FI 5 lens, at the other end. The film is Eastman Blue Brand, high speed x-ray film, cut to fit a regular 4 x 5-inch Graflex holder. The x-rays pass through the subject, actuate the screen to fluorescence, and are absorbed by the lead glass filter. The camera records the fluorescent image. We use 200 M.A. at 40 inches, with 80 K.V. maximum at 0.2 to 0.3 second exposure. Fluorophotography with the above technique requires four times the energy used for ordinary 14 x 17 film at six feet distance because the film is three feet from the screen and only one screen is used.

Attached to the large end of the photographic unit is a bracket for a regular 14 x 17 cassette, which we use for re-raying suspicious lesions found in the 4 x 5 films. The technique used here is 100 M.A. at six feet with 0.1 second exposure.

We decided to use miniature films, not only because of economy in expense and storage but also because of ease and rapidity in handling. Our experience in taking 9000 14 x 17 films led to these conclusions:

1. When it is known that you give a good physical examination, including an x-ray of the chest, very few present themselves with lesions which they know will result in their being rejected. These people go elsewhere for employment.

2. When they have passed the physical examination they lose their fear of being x-rayed, and often present themselves for re-ray voluntarily.

3. The pathology we found in the 9000 14 x 17 chest films was such that we felt sure we could recognize it on miniature film. In choosing between the two popular sizes, we decided to use 4 x 5 in preference to the 35-mm., because of the following reasons:

(a) It is x-ray film and can be handled with the ordinary safe light, and can be processed in x-ray processing solutions which we must use to process the other x-ray films. The 35-mm. require handling in total darkness, and also require special solutions.

(b) The 4 x 5 films are furnished in sheets instead of a roll, and can be taken singly and processed separately without dismantling the camera and roll. We like to process our film and see the plate before the man is hired. This is not convenient with the 35-mm. film.

(c) The speed factor and ease of handling are in favor of the 35-mm. film, but only where 100 or more are hired per day is this to be seriously considered. We examine from five to 50 per day, and under these circumstances the 4 x 5 is fast enough.

(d) In regard to accuracy, we felt the 4 x 5 to be more accurate. It is well known to photographers that a 2¼ x 3¼ taken under like conditions with the same camera using a 35-mm. adapto gives a better enlargement than the 35-mm. It is, therefore, apparent that a 4 x 5 should give a better result than the 35-mm.

(e) The 4 x 5 is readily interpreted without magnification.

(f) We file the plates in an alphabetical file with the interpretations on the folder. This obviates the necessity of using an extra numerical file. We find the expense of purchasing and processing to be about one-tenth that of the 14 x 17 films. Before using the 4 x 5 films we changed developer about every three weeks, now we change about every three months. In storage we use the numerical file for 14 x 17, 10 x 12, 8 x 10, etc., and file the 4 x 5 in the alphabetical file along with all interpretations.

We have found four cases of tuberculosis and one of advanced mycosis, all of which are under sanatorium care. It is our policy to re-ray all suspicious lesions found in the 4 x 5, taking them on a flat 14 x 17, and referring them to a competent radiologist or chest specialist for advice.

For those who contemplate the purchase of x-ray equipment for 4 x 5 technique, I would advise the minimum in a transformer to be capable of delivering 100 K.V., and a rotating anode tube with a capacity of not less than 250 M.A. The 4 x 5 is available in stereo, the plate being 4 x 10. This is rated very high in accuracy by competent radiologists. We did not get a 4 x 5 stereo because we had a 14 x 17 stereo which we decided to use where stereoscopic views were indicated.

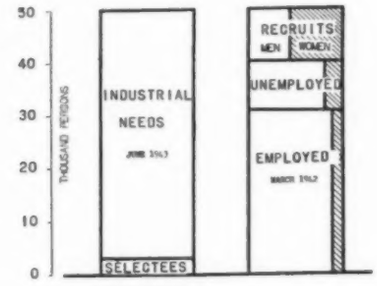


Chart I.
Manufacturing Labor Force Outlook for Saginaw, Bay City and Midland Area

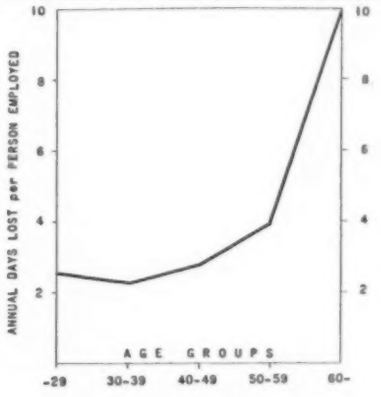


Chart II.
Severity of Sickness Absenteeism by Age Groups among G. M. Wage Earners, 1940

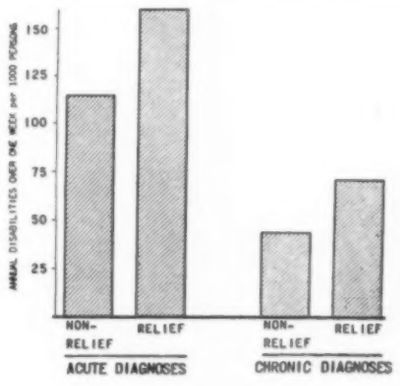


Chart III.
Sickness Absenteeism Related to Economic Status. (National Health Survey of Urban Families, 1935-36)

Sickness Absenteeism

—Present and Future—

A. T. COURT,
Labor Economics Section,
General Motors Corporation

THE U. S. Public Health Service reports that male sickness absenteeism reached a new high record of 90 cases of more than a week per thousand employees, for the calendar year 1941, compared with an average of 85 for the previous year, and of 81 for the five-year period from 1936 through 1940. General Motors records also showed no improvement in 1941. Many of the changes in social and industrial organization which will be necessitated by the all-out war effort will probably contribute to further sharp increases in the level of sickness absenteeism.

Chart I compares the forecast of the manpower requirements in the Saginaw, Bay City, Midland area. Offsetting against these the number of persons now working, and the registered unemployed, leaves a balance of 10,000 persons to be recruited from retired persons, housewives, very young persons and those in redundant service jobs. The situation is similar in practically every G.M. location.

The hiring of the unemployed and the recruiting of these additional workers will probably bring distinct changes in the sickness absenteeism picture.

Older Workers

MANY of these new employees will be older than the present average. Chart II shows the high rate of lost time which has characterized G. M. older men. The average for those in their fifties is 50% above that for younger workers, while men in their sixties have a sickness lost time rate of about four times that of younger persons. As "tool makers from 48 to 99 years old" are pulled back into industry, it seems likely that the problem of sick absenteeism will increase.

Former Unemployed

A SECOND factor tending to increase absenteeism will be the re-employment of persons long unemployed. Chart III compares relief with non-relief sick absence rates for acute and chronic diagnoses. In the case of chronic disabilities the relief experience is almost 65% higher than for non-relief cases, while for acute diagnoses the excess is only 40%. Persons who have long been unemployed are much more likely to be handicapped with chronic disabilities than are employed persons. Some persons in these groups, e. g., tubercular, will be difficult to assimilate even under very serious pressure for additional labor supplies. However, it will become increasingly necessary to hire persons whose physical condition indicates the likelihood of an unfavorable absenteeism record, or at least the necessity of some repairs.

Chart IV compares the experience of relief families with that of families in moderate income groups, the length of the bar indicating the degree in which relief clients exceed the disability rate for the population as a whole. The tremendous excess of hernia among persons on relief is of particular significance to General Motors because the past disability record with respect to non-industrial hernia among General Motors men has been three times as high as the average for all reporting manufacturers.

General Motors has been engaged in a generous repair program among its regular employees. What will happen to absenteeism from this cause when it becomes necessary to hire the impaired unemployed? Normally, these persons would not participate in health or hospital insurance plans.

It is worth noting that quite a number of the diagnoses relatively frequent among relief families are susceptible to operative repair. Certainly, it is socially desirable to have the industrial population of the country put into first class physical condition; however, General Motors cannot be expected to underwrite a general public health program, nor could the health and hospital plans stand the cost of such a program.

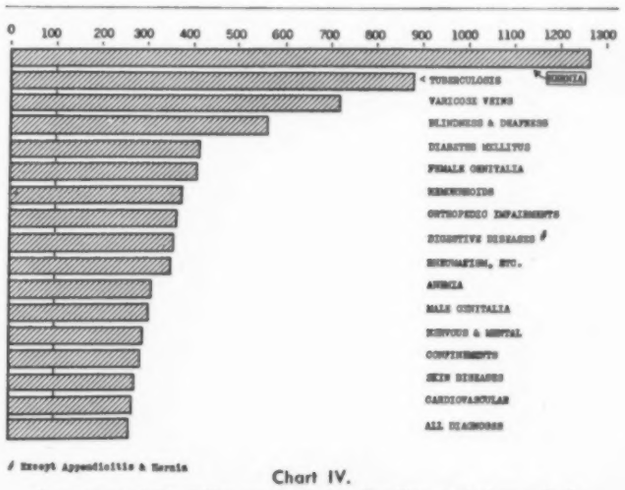


Chart IV.
Frequency of Disability among Relief Families, stated as a Ratio To Frequency in Moderate-Income Group

Chart V.
Absenteeism by Sex

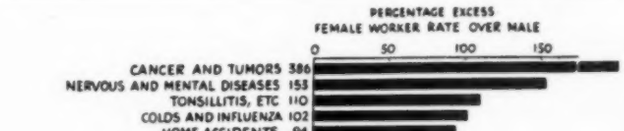


Chart VII.
Relative Frequency of Various Disabilities by Sex (Source, National Health Survey of Urban Families, 1935-36)

More Women

A THIRD factor of change in the character of the working force which may make for an increased problem of sickness absenteeism will be the influx of women, particularly married women, into the munitions manufacturing plants to take the place of men who have been drafted, and to provide the needed expansion in the total force.

Chart V, comparing the severity of absenteeism by sex, brings out the fact that in both the U. S. Public Health Service figures and General Motors, short-term absenteeism runs substantially higher among women than among men. G. M. figures on sick absenteeism of over a week show a much wider sex differential, but there is some question concerning their statistical adequacy.

The Scotch figures show that the excess of female absenteeism is found mainly in married women and that the record for single women is only slightly higher than for men. The Scotch figures would suggest the advisability of investigating the rates for married and single women in those General Motors plants where a substantial number of women are employed. In this connection it is of interest to note that for General Motors plants as a whole, the *male* non-industrial *disability* rate is significantly higher in plants employing a substantial number of women (Chart VI). The pattern of diagnosis is, of course, widely different between men and women. If men are more likely to be sick when they work with women, the hiring of large numbers of women will tend to raise the sickness absenteeism rate in this country in the next few months.

Chart VII presents the result of a recent U. S. Public Health Service Study comparing the sexes by diagnosis. So much for the change in the character of the working force.

Working Conditions

SOME of the factors which may contribute to the general problem of absenteeism are, fatigue caused by longer working hours, unsatisfactory home arrange-

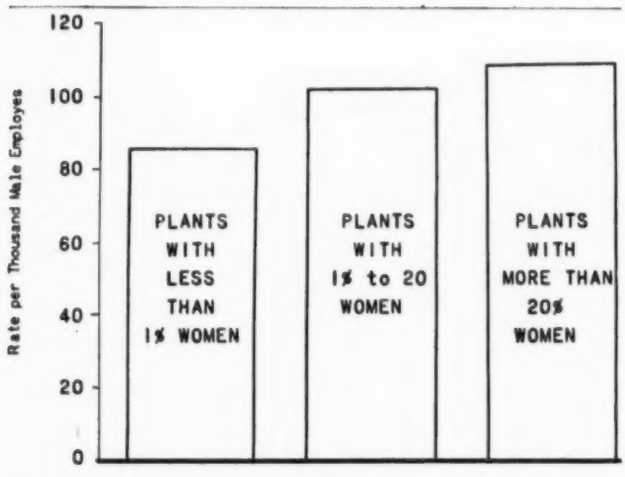


Chart VI.
Non-Industrial Disability Rates among G. M. MALE Wage Earners, 1940

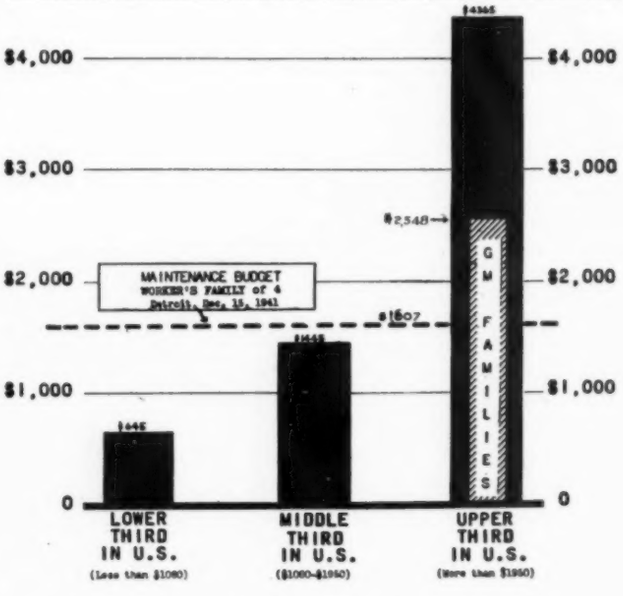


Chart VIII.
G. M. Wage Earners in "Top Third" of 1941 Incomes in U. S. —Families and Single Individuals (G. M. Average $2141 for Regular Employees; G. M. Family Incomes Estimated at 19% additional—BLS estimate; Distribution from OPA)

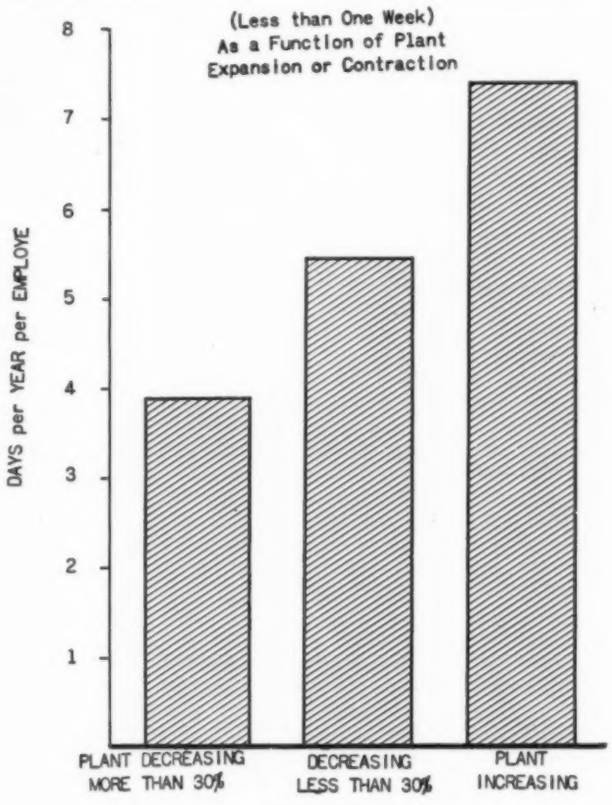


Chart IX.
Personal Absenteeism, January, 1941, to April, 1942

ments resulting from the employment of women, inability to buy needed merchandise necessitating makeshifts, more employment on night shifts, and staggered shifts for members of same family. A good proportion of all absenteeism will be reported as sickness. To date the information developed from various General Motors reports of absenteeism does not provide any statistical evidence of the importance of these factors; however, they cannot be ignored.

No Merchandise Incentives

THE high level of individual and family earnings, combined with rationing and disappearance of the durable goods such as cars and mechanical household goods, will reduce the sumptuary motives which frequently play an important part in stimulating wage earners' efforts. The infrequency of substantial savings among wage-earner families, even when their total incomes are well above the full budgetary requirements for health and adequate maintenance, indicates the importance of immediate purchases (as contrasted with provision for the future) in the scale of values of industrial population. This problem of nothing to buy will probably be particularly acute in the case of General Motors workers because the average annual earnings (Chart VIII) are far above the budgetary requirements for the standard family of four. Under the war effort, these earnings will be further sharply increased by longer hours of work and more employment for wives and daughters. The disappearance of durable consumer goods and the freezing of the cost of living will leave a surplus income, with little immediate outlet for expenditures. Appeals to patriotism and loyalty will remain, but even in England in recent months the problem of excessive absenteeism where workers' earnings are well above the permitted purchases has been acute. Recently, special rations of tobacco, beer and other

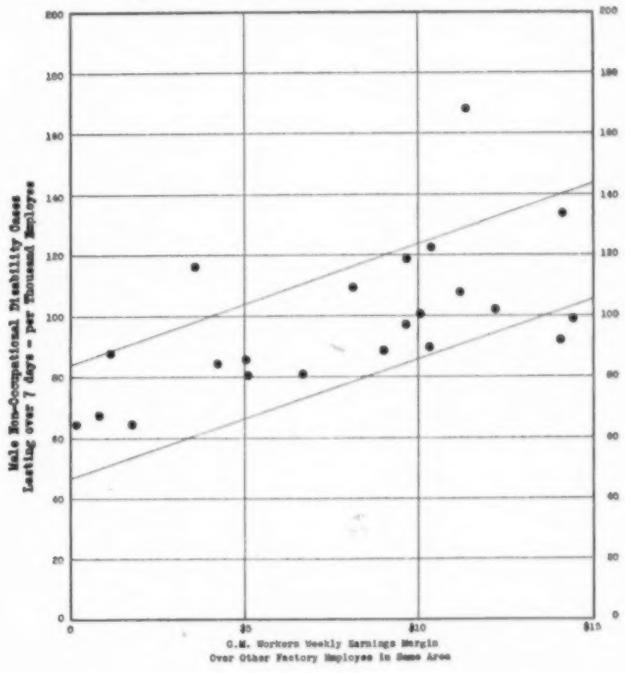


Chart X.
Disability Rates Compared with Excess of Weekly Earnings—G. M., 1940

highly taxed consumption items have been made available in larger quantities for purchase with overtime earnings.

Indirect reflection of the possible effect on absenteeism of rapid expansion in employment is provided by Chart IX, which shows the short time absenteeism for all causes, averaged for those G. M. plants which have been shrinking rapidly, compared with plants which have been increasing their employment. Today, expanding plants have an absenteeism record of 90% above the sharply shrinking plants. Three months from now practically every plant will be greatly expanded. Note in Chart X how G. M. rates tend to be highest where G. M. workers have high earnings relative to the general level.

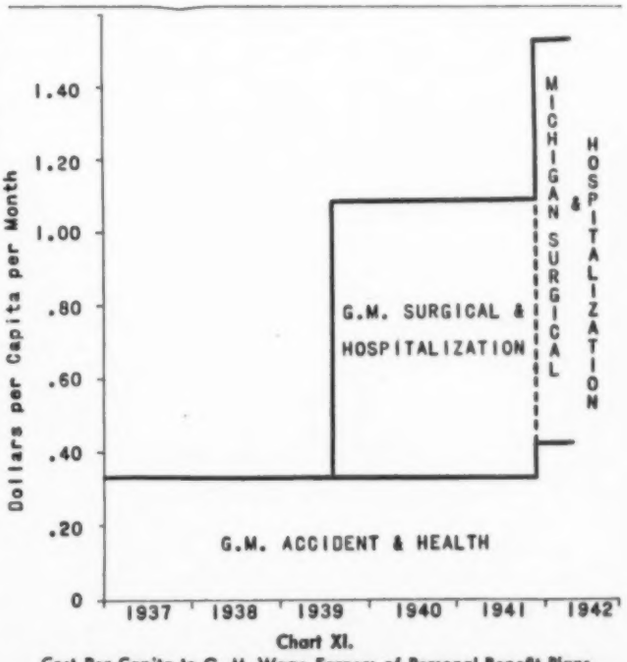


Chart XI.
Cost Per Capita to G. M. Wage Earners of Personal Benefit Plans

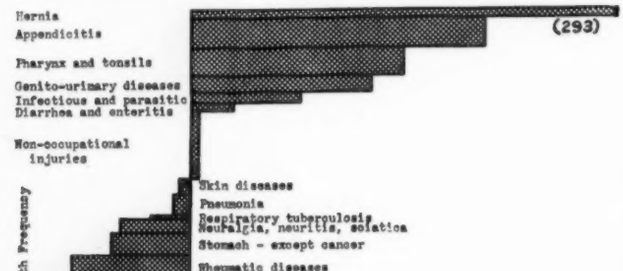


Chart XII.
Male Non-Occupational Disability rates per Thousand Employees in 1940—General Motors Compared with U. S. Public Health Average by Diagnosis

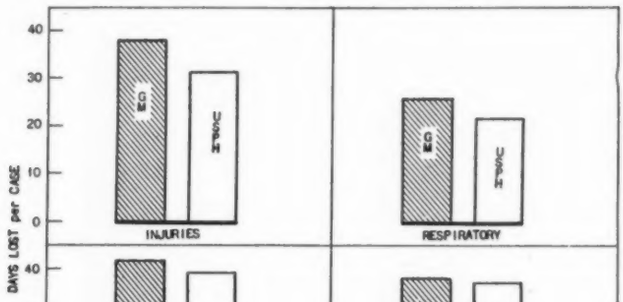


Chart XIV.
Average Duration of Non-Industrial Disabilities by Diagnosis—General Motors Compared with U. S. Public Health Reports on Male Wage Earners in 1940 (Averages Include only Duration of 8 through 98 Days)

Investment Theory

ANOTHER factor which may tend to increase the rate of sickness absenteeism is the recent increased cost per capita to General Motors wage earners for their total accident, health, hospital and surgical insurance (Chart XI). General Motors records indicate that before hospital and surgical insurance was offered disability rates were about 25% below the national average. Last year General Motors showed the SAME level as did reporting industry as a whole. About 20% of the total General Motors experience was operable diagnoses in excess of the national standard.

Recently there has been an increase of 40% in the cost to the wage earner for personal health and hospitalization insurance in G. M. Michigan plants. This is due in small part to increased expenses incurred under the accident and health insurance plans, and in a large part to the substitution of Michigan surgical and hospitalization coverage for the former G. M. plan.

Many covered persons seem to regard all insurance payments as a sort of investment similar to endowment life policies on which they can reasonably expect a return with interest. If this is general, the sharply increased cost of insurance to the worker might result in some increases in the rate of sickness absenteeism. So much for the factors which tend to increase the absenteeism problem during the war period.

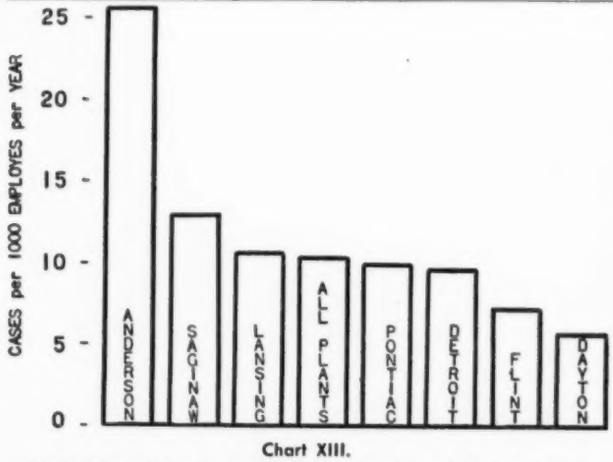


Chart XIII.
Male Appendicitis Frequency Rates in General Motors Plants in 1940 (City Average)

Possible Rates

THE recent British experience indicates that during a war period absenteeism can really be a very serious matter. Last year in the United States male absenteeism for all personal reasons probably runs about 5%. The British have reported up to 20% of lost time.

Absenteeism involved little social loss during the peacetime period of relatively slack employment. If a man was off the job another worker could easily be secured to take his place. What wasn't built today could be finished tomorrow. Equipment was running typically on a one or two shift basis, and it was possible to catch up later to provide banks which would absorb low production in any department.

Under the all-out war effort, with full employment, critical machinery being operated 168 hours a week, and with material shortages which will pull down process inventories, a day's loss due to unnecessary sick absence is a loss forever. The absence of a few individuals may disrupt the work of hundreds by unbalancing the scheduled flow of operations.

It is patent that the control of sickness absenteeism represents a serious and important aspect of the problem of achieving a maximum war effort. Perhaps a short comparison of the past experience of General Motors sick absenteeism with the national average will suggest certain particular qualities in the General Motors set-up which will be of special value in your thinking.

General Motors Frequency

CHART XII shows the non-industrial sick absenteeism for General Motors male employees relative to the rate for all industrial workers reported to the U. S. Public Health Service. It appears that in these diagnoses where surgery is frequently indicated, General Motors rates are substantially higher than the national average for a particular type of disability. Without further analysis, this is certainly no basis for criticism. It is reasonable to assume that a great many industrial workers do not have adequate surgical attention and it may be that the high General Motors record represents the true level of desirable surgical attention untrammeled by economic pressure on the individual, or it may represent catching up on overdue repairs.

However, there is another approach to this problem. Take, for example, appendicitis, which is the most fre-

quent of the operable diagnoses. Analyzing the 1940 record for General Motors cities, over 25 cases per 1000 employees appear at Anderson, in sharp contrast to a record of six cases per 1000 in Dayton, and five cases per 1000 for all companies other than General Motors (Chart XIII). The employed groups involved are much too large to attribute any major part of this to chance. No information suggests that occupational factors could explain any substantial difference in the appendicitis rate between Anderson and Dayton. It may be that the Dayton rate is far too low, however it is only slightly above the national average. In either case, it is difficult to explain the wide range of experience.

Duration

PASSING from this question of the frequency of operable disabilities—it appears that the duration of all disabilities among General Motors employees compared with information published by the U. S. Public Health Service show an excess above the national standard in every major classification. The difference ranges from one day in cases of circulatory disability to about a week for non-industrial accidents (Chart XIV).

In appraising the significance of the longer duration of disability, Chart XV shows the frequency of various durations for General Motors, compared with the record of six sick benefit associations, as published by the U. S. Public Health Service. The difference in the duration of disability in the case of General Motors is the result of an unusually small proportion of disabilities lasting between one and two weeks, and the quite high proportion of General Motors disability lasting from four to eight weeks. There is little difference in the incidence of severe impairments which resulted in very long disability. The rather irregular shape of the General Motors frequency distribution compared with the smooth harmonic outline of the experience of the benefit associations, suggests that some abnormal factor is at work in the General Motors picture. There is no evidence to suggest what the root of this situation may be. However, it is worthy of your attention. Excessive durations could be as much of a drag on the war effort as excessive frequency. So much for the specific peculiarities of the General Motors record.

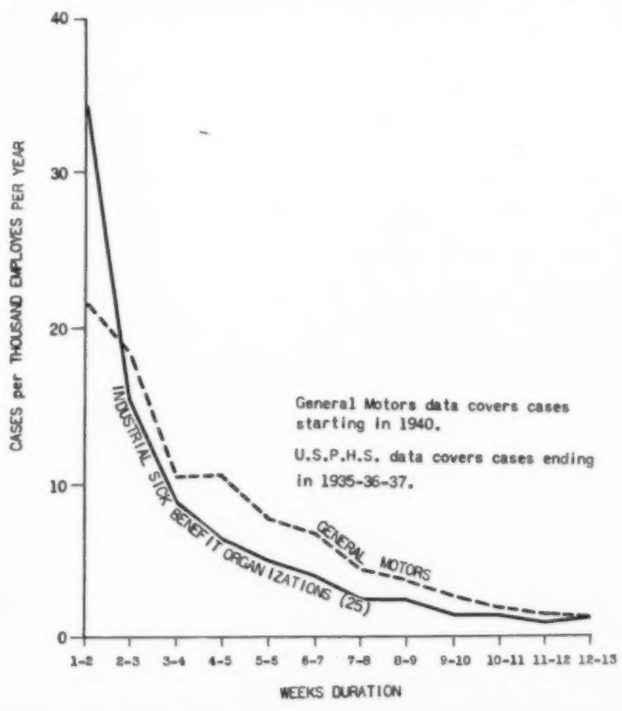


Chart XV.
Frequency by Duration of Non-Industrial Male Disabilities

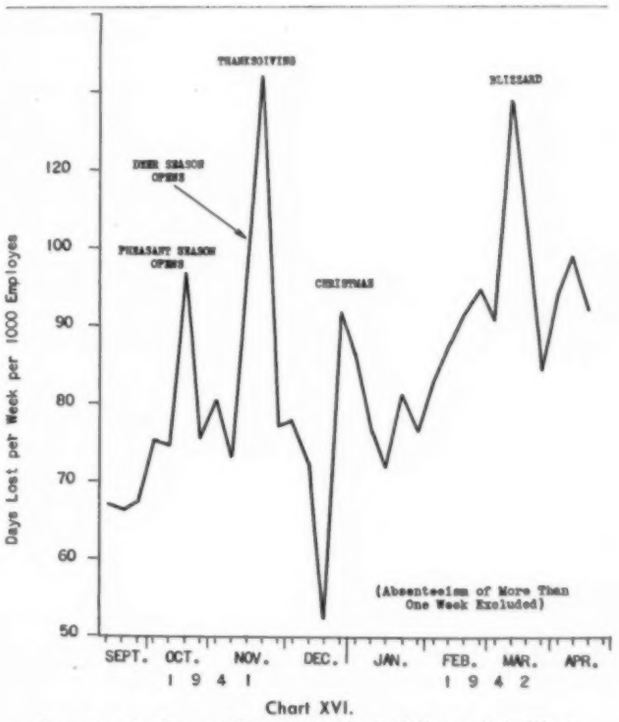


Chart XVI.
Days Lost for Personal Reasons by General Motors Male Wage Earners in Michigan Plants

Conclusion

IN CONSIDERING the factors that influence the national picture and General Motors' own experience, the important roll played by what might be called the non-medical factors is impressive (Chart XVI). Economic considerations, specific fiscal arrangements, and the pcint of view of the community seem frequently to play as important a role in the sick absenteeism record as do strictly biological forces. If plant physicians can contribute to the general coordination of policy necessary to keep absenteeism at reasonable levels, their contribution to the war effort will be of major importance.

Medical Decisions

—And Employee Relations—

H. W. ANDERSON,
Vice-President, General Motors Corporation

NEW employees and employees returning to work after a layoff period are usually referred to the plant medical department by the employment manager for examination prior to commencing work. The interview conducted by the employment manager or his representative is of short duration and consists primarily of the verification of names, correct addresses and other factual data.

The service to an employee by the medical department while receiving the first physical examination is one of the first plant services rendered before the employee commences work. While receiving a physical examination and furnishing other medical data an employee has the opportunity to observe the medical department in operation and form definite impressions in connection with the character of the service and the manner in which it is performed. Employees usually form opinions and judge any plant service

which directly affects them by the way in which it is done as well as by what is done. One of the first impressions of the plant—good or bad—may be made in the medical department. Consequently, impressions formed by an employee during the course of his physical examination become a part of the definite impressions which are reflected in the employee relationship with the employer. These impressions become more formalized as return visits to the medical department are made by employees during the course of their employment. In some of these return visits it is necessary for a member of the medical department to make a medical decision which affects, in some way, the employee relationship. The medical decision may affect this relationship in several ways, particularly under the terms of collective bargaining agreements.

A medical decision made after physical examination and a complete review of the employee's medical record may result in the loss of earnings by an employee for a short period, or, if the physical condition of the employee is of a serious nature, may result in the total loss of employment. In every instance it is, therefore, imperative that the medical decision be reached only after a thorough and careful consideration of all of the factors involved. Specific instances of medical decisions and their effect on employee relations have occurred in several cases appealed to the Impartial Umpire under the terms of a collective bargaining agreement.

It may be well briefly to analyze some of the decisions, as several of the cases establish fundamental principles.

MEDICAL DECISION AFFECTING THE APPLICATION OF SENIORITY:

Under the existing seniority arrangement at the plant an employee was entitled to return to work which was then available in an occupational sub-group made up of material handlers and truckers. The work done by these employees consisted of lifting and movement by hand truck of large quantities of heavy material in preparation for starting a new model. During the model year the employee was usually employed as a trimmer. The employee was examined by the plant doctor before commencing work and it was decided by the doctor that in view of his health record as well as his existing physical condition it would be a hazard to his health to assign him to heavy material handling.

The record kept by the plant medical department showed a long account of bronchial infections and the time the employee was away from work because of this condition. Also the medical record showed a gradual loss in weight over a period of years; the last record of the employee's weight showed it to be about 138 pounds. The Umpire, in deciding the case said:

"It is held in the present issue that the medical report provided ample reason for the decision of management that the trimmer was not capable of performing the trucking job. The evidence indicates the management did use the doctor's report in good faith. It should be noted, in this connection, that the man was assigned in a routine way to another job within a few days. The corporation did not violate the agreement in refusing to assign him to the trucking job because of the report of the plant doctor."

This case clearly established the following principles:

1. The employer can rely on and accept the report of a plant doctor based on an employee's medical record and a physical examination of the employee in determining if an employee is capable of doing certain work and not be in violation of the terms of a local seniority agreement.

2. The decision made by a plant doctor relative to an employee's physical condition and health, after full consideration of all factors involved, cannot be reviewed or questioned in Umpire cases.

MEDICAL DECISION AFFECTING RETURN TO WORK BY AN EMPLOYEE AFTER INJURY SUSTAINED OUTSIDE OF THE PLANT:

The employee injured his hand outside of the plant and was away from work for three days. Upon returning the employee asked his foreman for permission to see the plant doctor relative to his swollen finger. The injury was diagnosed as "probable fracture," and since the accident occurred outside the plant he was advised to see his personal doctor. The employee, upon consulting his personal doctor, was advised that the finger was broken, and splints and bandages were applied. The employee returned to work about two weeks later, and before starting work was sent to the medical department for examination. This diagnosis determined that he had an unhealed fracture, and he was advised again to consult his personal physician. In view of the condition of the fracture as shown by the x-ray plates it was determined by the plant doctor that it would be improper for the employee to return to work on his regular operation. This decision was disputed by the employee, as he claimed his injury should not prevent his return to work. The employee and his representative claimed that failure of management to assign the employee to work amounted to discrimination.

The significant conclusion reached by the Umpire in this case is as follows:

"The doctor's report on an employee's physical condition cannot adequately be discussed by laymen. If the doctor does not approve a man for work, it would be unreasonable to contemplate that the employee could nevertheless go immediately to his foreman and bargain with him over a matter about which the foreman has no knowledge."

The principle established in this case is as follows:

1. A doctor's report and determination made in connection with an injury which occurred outside of the plant cannot be reviewed by a layman nor can it become involved in collective bargaining procedure.

TERMINATION OF SICK LEAVES BY MEDICAL DECISION WHICH RESULTS IN LOSS OF EMPLOYMENT BY THE EMPLOYEE:

An employee had worked for a Division several years during which the plant doctor had an opportunity fully to observe the changes in his mental condition. Fortunately the plant doctor had kept a very complete case history of this particular employee, fully describing the mental condition as well as his own diagnosis and conclusions.

While the employee was working in the plant it was necessary, over a period of years, to grant him several leaves of absence so that he could be removed from the environment of an industrial establishment and spend some time with relatives who lived in a farming community. A complete case record was kept of all medical leaves of absence by the medical department and the reasons for granting them. Finally this employee's mental status changed to such an extent that it was necessary for him to receive hospitalization in a regular institution. After spending somewhat over a year in the institution, he returned and claimed that he was entitled to go back to work.

The plant doctor, after fully considering the case history and the condition of the employee, concluded that his mental condition was of such a nature at the time that it would be inadvisable to issue or extend further sick leaves and also that the mental condition

had reached such a status that it would be improper to permit him to return to work.

The employee's representatives claimed that the decision of the plant doctor resulted in violation of the seniority provisions of the local and national agreement. The employee and his representatives endeavored to show that the conclusions reached by the plant doctor were wrong, and the employee went to several outstanding psychiatrists and doctors in the vicinity. Their various diagnoses and conclusions were submitted to the Umpire at the time the matter was heard.

A similar case arose in connection with an employee who had serious epileptic seizures. The plant doctor likewise kept a complete case history in connection with this employee's condition over a period of about a year and a half. Finally it was determined that the employee's health was of such a nature that he should be given a medical leave of absence for a short time. After the expiration of the leave of absence it was determined, upon reviewing the employee's case history and his physical condition, that further leaves of absence would not be granted and the employee would not be returned to work.

In deciding one of these cases the Umpire stated:

"In cases, such as the present one, the Umpire cannot evaluate medical opinion but does have an obligation to review the facts in order to determine whether management has acted in good faith and without union discrimination. The Umpire finds an absence of any such factors in this case and must, therefore, recognize management's right to decide whether or not the sick leave of this claimant should be terminated. In the exercise of such right, management must be given the opportunity to use reasonable caution and can well concern itself with the question of whether or not a recurrence of an illness is likely or possible. In the present case, management has exercised such reasonable caution, which is fully within its rights under Clause 3-c of the Recognition Section."

These cases establish the following principle:

The facts in a particular case can be reviewed by an Umpire, but he is not in a position to evaluate medical decisions given by a plant doctor and specialists engaged by an employee to establish findings in connection with the employee's condition.

PLACEMENT OF INJURED EMPLOYEES ON OTHER WORK AND RETURN OF INJURED EMPLOYEES TO REGULAR WORK:

Two employees injured their hands while at work in the plant and it was recommended that they be placed on light work for a short time after their return. After they were assigned to light work for several weeks they were examined by the plant doctor and it was determined by him that they could return to their regular operation. It was then claimed that the employees were not ready to return to their regular operation and it was improper for the management to assign them to other than light work until such time as the employees determined that they could do other work.

The Umpire said in his decision:

"Management acted quite properly in reassigning M. to his regular job when the plant doctor approved, since neither management nor the employee can professionally answer the question of when an employee was able to resume his regular duties. In the present case, for instance, one cannot be certain whether M. could not do his regular job or did not care to do so."

This case clearly establishes the principle that the management can rely on and follow a medical decision of a plant doctor in determining whether or not an employee's condition is of such a nature that he can be assigned to his regular work.

There have been a few cases not involving in any way a medical decision or the confidential case record of an employee. However, the medical department became involved in one such case indirectly. An employee was discharged for improper conduct, as well as failure to do the work properly. Upon receiving his discharge from the plant he went to the medical department and claimed that he was ill without disclosing the fact to the medical department that he had been discharged.

The point was raised in the case that the reason for the employee' improper conduct on the day of his discharge was because of illness. Fortunately the medical department record was clear, showing that the employee had a slight head cold and his temperature and pulse were normal.

In another case it was claimed by an employee with excessive absenteeism after payday, that he had various illnesses and conditions which were treated upon the day of his return by the medical department. The employee, upon being discharged, claimed that during the course of his employment he had various treatments for a number of things at the medical department and during his absence had various kinds of treatments and operations.

The medical record was not kept in sufficient detail or with sufficient regularity to determine whether claims of the discharged employee had any foundation.

In this particular case the employee claimed a large number of visits to the plant medical department which, in some instances, were no doubt exaggerated, but, owing to the fact that there was some irregularity in keeping records, it was impossible to rely on such records and be in a position to show that he was making an unfounded claim.

In conclusion, in those cases where a medical decision was made after the doctor had fully considered the medical record of the employee as well as the conditions existing at the time of his examination of the employee, the medical decision of the doctor and its application have been supported in all cases by the Umpire.

It is, therefore, important that all medical decisions which are made by the medical department and which eventually will have an effect on an employee's status under a collective bargaining agreement, be carefully considered and be made on the basis of a physical examination, diagnosis, and the employee's health record.

The Treatment of Burns

GROVER C. PENBERTHY, M.D.,
Detroit, Michigan

IT IS TIMELY to discuss the management of the burned patient, especially since we are engaged in a war where the number suffering from severe burns may be high. One need only recount the attack on Pearl Harbor and the sinking of tankers off the Atlantic coast to realize that burning oil and gasoline contributed materially to the reported casualties in Hawaii and on the Atlantic. This is in many respects a different kind of war from World War I.[18] The mechanization of troops develops burn hazards, and tank warfare as well as air fighting also impose thermal hazards not commonly seen in the open infantry or trench warfare.

The civilian populations will suffer casualties be-

From the Surgical Service, Children's Hospital of Michigan, and Wayne University College of Medicine. Presented also at the Twenty-Seventh Annual Meeting of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, Cincinnati, April 14, 1942.

cause of bombing and be subjected not only to the danger of falling buildings and concussion, but also fires. In this war thermal injuries may account for the greatest loss of life and limb, where pestilence or trauma from projectiles took the toll of lives in other wars.

In this discussion of the treatment of burns it may be assumed at the outset that the ideal form of therapy is probably not at hand and there is much to be desired. The field for research and development is broad. However, a review of the literature[13] and reported statistics as published over the past 20 years indicates progress in the treatment of burns as a result of the interest shown by both the laboratory worker and the clinician. Today one seldom observes the picture as described of the severely burned patient seen in the first 25 years of the present century, as resembling the pre-Listerian or "laudable pus" days.[15]

Medical history has recorded a new era in the management of the severe burn case which may be said to have begun with the introduction of the tannic acid method of treatment of burns as advocated by Davidson[10] in 1925 and which virtually revolutionized the treatment of the diffuse burn. This contribution of therapy for thermal injuries has not only relieved suffering and saved lives but also has influenced and stimulated others in their research on thermal injuries. This interchange of ideas and experiences, combined with emphasis of certain important fundamental points, has developed a better understanding of the problem and a more rational basis for therapy.[19] There can be no outline of treatment for general use, as each burned patient deserves individual consideration.[20] Prior to 1925, the results obtained in many instances were assumed to be satisfactory. The statistical studies, however, showed that the results were far from gratifying. The morbidity was prolonged and the mortality was high, varying from 30 to 40%.

The pre-Davidson period was not necessarily a period of bad treatment but rather one of varying and unstandardized methods. The burns seen regularly by any one physician were not many, and the development of basic understanding as well as standardized methods was not readily established. The chief concern during this period was treatment of the local burned area. Speculations and some experimental work were concerned with the cause of death, but advance toward an understanding of the underlying pathological processes in the burned patient was difficult.

Factors Influencing the Prognosis

A COMBINATION of factors influences the prognosis for recovery in the case of every severely burned patient. The general care is of primary importance and this means attention to the prevention and treatments of shock and minimizing infection. The extent of the burn bears some relation to the severity of shock but is not to be relied upon, inasmuch as this reaction may accompany burns of a lesser degree. Shock should be treated by the application of heat, the administration of sedatives in sufficient amount and by the usual supportive measures. Blood plasma, if available, should be given with the immediate attention concentrated on the treatment of shock[17] rather than on the local lesion. Intravenous saline and glucose solutions are essential to prevent anhydremia in second and third degree burns. Hemoconcentration, as noted by Cummin[9] in 1823 but demonstrated by Underhill[25] and his associates, is present early in the case of the severe burn, with the red blood cell count, blood nitrogen, and blood sugar elevated, while the blood chlorides are reduced. A lowered serum protein appearing after a few days indicates the need for a blood or plasma transfusion. Whole blood should be given later in the course of treatment, if secondary anemia develops.

In the case of the severely burned patient, there is a rapid increase in the hematocrit reading during the first six hours. During the following 12 hours there is a gradual increase with very little change later. A study[24] of the blood of a severely burned patient showed that the hematocrit was 71% at the end of the first hour, indicating that there was a loss of approximately half of the plasma volume. It was further found that giving the adult 5,000 to 6,000 cc. of saline solution intravenously during a 14-hour period caused a marked drop in plasma proteins frequently to the edema level. Similar observations have been reported by others.[14, 17] Therefore, it is advisable to utilize glucose solution to combat dehydration and limit the use of saline. Intravenous blood plasma decreases the hemoconcentration more effectively, without causing a drop in plasma proteins. Whole blood given with moderate amounts of saline will tend to prevent a marked drop in plasma proteins, but does not reduce the hematocrit as rapidly as plasma. After a reasonable experience it has been the plan in the case of a burn involving a third or more of the body to administer 1,000 cc. of blood plasma and 1,000 to 2,000 cc. of glucose and saline solutions intravenously in a 24-hour period. The remaining amount of required fluid is given orally.

Saline and glucose solutions temporarily raise the blood pressure and may be given to fortify the patient until blood or plasma is available. The temporary action of these agents is due to their rapid elimination by the kidneys; blood on the other hand, is retained longer because of its protein content of the blood, the serum alone is vital to this action.[8]

Following a burn, the permeability of the capillaries[25] is in one direction only, namely, from the capillaries to the tissues. If only saline or glucose solutions are available, the administration of adrenal cortex hormone may be of added benefit, as it is claimed to restore and maintain capillary tone. The clinical experience of Wilson, Rowley and Gray[26] show favorable results with use of an extract of suprarenal cortex. The use of the synthetic analogue desoxycorticosterone acetate[27] has also given satisfactory responses. It has also been shown [22] that adrenal cortical extract is of value in the treatment of the fluid shift occurring in patients after severe burns and reduces the amount of plasma that is required to restore the circulation to normal.

The burn lesion, at the time of the accident is sterile and free from pus-producing organisms, but, in spite of surgical prophylaxis, infection in most instances is inevitable—Firor and Aldrich[16] in their studies in 1932 took repeated cultures from the burned areas and from the fluid under the blebs and found that for the first 12 hours these areas were practically sterile, except for a few staphylococcus aureus and albus and bacillus coli, which they considered contaminants. After this 12-hour period the cultures in 100% of the severely burned patients showed repeated cultures of betahemolytic or the gamma streptococcus were obtained. Coincident with these findings there was observed evidence of the characteristic signs of toxemia.

The toilet of the burned area cannot be emphasized too strongly in view of the inevitable infection which may follow. This, combined with the application of tannic acid 5% followed by silver nitrate 10%,[5, 6] gentian violet 1%, or the triple dye, and these two applications followed by silver nitrate 10% to form an early coagulum should act as a barrier to infection. In the war burn use of the sulfanomide drugs may prove of inestimable value, not only locally but orally as well.

Toxemia of Burns

THE factors involved in the development of the toxemia which accompanies severe and extensive burns have been widely discussed. Uniformity of opinion on this question is lacking. It sems quite probable that infection may be responsible, especially as shown by the studies of Aldrich.[1] On the basis of bacterial invasion of the local lesion together with the presence of concurrent infections in children, we instituted chemotherapy in 1939.[19] Sulfapyridine was used at first, but when sulfathiazole became available for experimental purposes we used the latter with apparent better results. It has been our practice to institute chemotherapy when the temperature reaches 102° F, and the dosage is calculated on the basis of weight. A total of 1¼ grams per pound of weight of the child is given in the 24-hour period in divided doses at four or five hour intervals. In the case of adults one gram is given every four hours. The dosage is then governed by frequent blood level determinations. A favorable clinical response with a decline in temperature is usually apparent in a few hours. The need for this therapy depends upon the clinical course and blood level determinations. There have been no deaths or serious reactions in the group of 92 patients so treated.[18]

Surgical Management

AN EXTENSIVE burn lesion may be compared to a large open wound and deserves rigid aseptic surgical care.[20] The importance of thorough cleansing combined with debridement of the involved skin areas, cannot be too strongly emphasized. This includes the removal of all foreign material and necrotic tissue, the opening of blebs and blisters, and the removal of loose skin, together with gentle but complete cleansing of the involved surfaces with saline and boric acid solutions. The use of soap and water, but not scrubbing the burned surface, and solvents or a detergent to remove oil may be necessary, and this followed by thorough washing with physiological saline solution. The burn resulting from acid or an alkali should always be thoroughly washed with water before applying a neutralizing agent.[11] In most instances the proper preparation of the burned area may be successfully carried out with little pain by the use of sedatives, such as codeine in the case of young children and morphine in the adult.

Light anesthesia may be required if preparing the part causes too much pain—sodium pentathal administered intravenously by a competent anesthetist provides a satisfactory type of anesthesia for the preparation of extensive burned surfaces. This type of surgical care is what would be expected in the civilian hospital where the patient is hospitalized early. War-time conditions, however, may not permit of the ideal surgical toilet of the burned surface. The local use of sulfanilamide and the work recently published by Pickrell[21] in the use of a 3% solution of sulfadiazine in 8% triethanolamine applied by spray or in suspension as compresses may be found to have possibilities and value in the treatment of burns where early hospitalization is impossible. There can be no doubt but that out of the experiences of this war will come a contribution to add to our present knowledge in the treatment of burns and other surgical problems as well.

Burns of the hand, forearm, and feet, face and genitalia deserve special attention. Allen[3] has re-emphasized and called attention to the value of aseptic surgical preparation of burns of the hand and following this with the application of a non-adherent type of dressing, such as petrolatum gauze. To this is added a voluminous soft dressing, bandaged to exert pressure to all parts involved, thus minimizing edema and the loss of fluid. The part is then splinted in the position of function and the dressing not disturbed for several days or two weeks. Burns of the face may be treated by the application of saline compresses or Blair's jelly[7] combined with moderate pressure. Gentian violet 1% is preferred as the local application about the genitalia and perineum. Saline or boric and moist dressings may also be considered for burns involving the genitalia.

Tannic Acid

THE use of tannic acid in the treatment of thermal injuries has previously been described[4, 12, 13, 15, 19, 23, and has maintained a well deserved place in the practice of many surgeons. Medical science, has progressed, and it is in keeping with such progress that changes have developed relative to therapy. It should not be considered a panacea, and it is exercising poor judgment for one to assume that tannic acid should be used in the treatment of all diffuse burns, especially in the light of our present knowledge and understanding. However, the basic concept of possible toxic absorption from the site of the burned lesion which led to Davidson's work must be recognized until satisfactorily disproved. Some of the criticism of the tannic acid method of treatment is unjustified, owing to the failure of the critics to recognize the basic surgical principles underlying this form of therapy. The need for thoroughly cleansing the burned area surgically before the application of tannic acid has been emphasized to reduce the tendency to infection, but it must not be expected to be perfect. Furthermore, the application of tannic acid is not to be encouraged if the burned lesion has existed 24 hours or more and has not been properly treated as a surgical wound. The tannic acid jelly may be substituted for the freshly prepared aqueous solution if the latter is not available. The use of a 10% silver nitrate solution[5, 6] to be followed shortly after the application of tannic is desirable and quickly produces a coagulum. This combination also aids in minimizing infection. Infection beneath the tannic acid coagulum may prove troublesome, and when recognized the coagulum or leathery coat should be removed and moist dressings substituted.

Gentian Violet

GENTIAN violet in a 1% aqueous solution or the triple dye, as more recently advocated by Aldrich[2] is preferred in burns showing evidence of infection when first seen, or in cases of more than 48 hours' duration when first treated. Burns involving the perineum or genitalia, the hands and feet, and deep burns encircling the extremities or in the region of joints should be treated with this preparation. The coagulum produced by either gentian violet or the triple dye is more pliable and obviates splitting of the protective coating over joint areas and permits more freedom of the joints. The dye may also be combined in the treatment, following the use of tannic acid, where there is separation and evidence of infection about the edges of the coagulum. Silver nitrate 10% may also be used in conjunction with the dye.

Later Treatment

THE details of the management of the burn wound following the separation of the coagulum have been emphasized in previous publications.[19] Of prime importance is the early skin grafting of the granulating wound.

This will convert an open wound into a healed wound and with a lessened possibility of future contractures and deformity.

Conclusions

SHOCK associated with a diffuse burn requires primary consideration before treating the local wound.

2. The burn wound requires surgical preparation based on sound aseptic principles.

3. The choice of local treatment depends on the time elapsed before therapy is instituted and the anatomical location of the burn.

4. General supportive measures to restore and maintain the chemical and nutritional balance of the patient, are essential in reducing the morbidity and mortality of wounds associated with burns.

5. Early skin grafting will aid greatly in minimizing local loss of tissue fluid and will decrease contractures and deformity.

References

1. ALDRICH, R. H.: *New England J. Med.*, 208:299-309, 1933.
2. ALDRICH, ROBERT HENRY: The Story of Burns. 1941.
3. ALLEN, HARVEY S.: *J.A.M.A.*, 116:1370-1373, 1941.
4. BEEKMAN, F.: ARCH. SURG., 18:803, 1929.
5. BETTMAN, A. G.: *J. A. M. A.*, 108:1490-1494, 1937.
6. *Idem.: Northwest. Med.*, 34:46-51, 1935.
7. BLAIR, V. P., BROWN, J. B., and HAMM, W. G.: *J. A. M. A.*, 98:1355-1399, 1932.
8. CHOISSER, R. M., and RAMSEY, E. M.: *Proc. Soc. Exper. Biol. & Med.*, 38:651-652, 1938.
9. CUMMIN, W.: Cases of Severe Burn; with Dissections, and Remarks. *Edinburgh Med. & Surg. J.*, 19:337, 1823.
10. DAVIDSON, E. C.: Tannic Acid in the Treatment of Burns. *Surg., Gyneo. & Obst.*, 41:202,, 221, 1925.
11. DAVIDSON, E. C.: *Am. Surg.*, April, 1927.
12. GLOVER, D. M., and SYDOW, A. F.: *Am. J. Surg.*, 51:601, 1941.
13. HARKINS, H. N.: Recent Advances in the Study of Burns. *Surgery*, 430-465, 1938.
14. MADDOCK, W. G., and COLLER, F. A.: *Ann. Surg.*, 112:520, 1940.
15. MCCLURE, R. D., and ALLEN, C. I.: Davidson Tannic Acid Treatment of Burns. *Am. J. Surg.*, 28:370-388, 1935.
16. MASON, ROBERT L.: Pre-operative and Postoperative Treatment. W. B. Saunders Company, p. 264. 1937.
17. MINOT, A. S., and BLALOCK, ALFRED.: *Ann. Surg.*, 112:557, 1940.
18. PENBERTHY, GROVER C.: Trends in the Treatment of Burns. Presented before The Central Surgical Association, February 27, 1942.
19. PENBERTHY, G. C., and WELLER, C. N.: *Am. J. Surg.*, 46:468-476, 1939.
20. PENBERTHY, G. C., and WELLER, C. N.: Treatment of Burns, *Surg. Gyneo. & Obst.*, 74:428-432, February, 1942.
21. PICKRELL, K. L.: *Bull. Johns Hopkins Hosp.*, 69:217-221, 1941.
22. RHOADS, J. E., WOLFF, WM. A., and LEE, W. E.: *Ann. Surg.*, 113:955-968, 1941.
23. SEEGER, S. J.: Treatment of Burns. Lewis, Practice of Surgery, Vol. I, Chap. 17. W. F. Prior Co., Inc.
24. TENERY, R. M.: *Surg., Gynec. & Obst.*, 72:1018-1027, 1941.
25. UNDERHILL, F. P., KAPSINOW, R., and FISK, M. E.: *Am. J. Physiol.*, 95:315-324, 1930.
26. WILSON, W. C., ROWLEY, G. D., and GRAY, N. A.: *Lancet*, 1:1400-1402, 1936.
27. WILSON, W. C., and STEWART, C. P.: *Tr. Med-Chir. Soc. Edinburgh*, pp. 153-173, 1938-1939; in *Edinburgh*, M. J., November, 1939.

Injection Treatment versus Open Operation

—In Hernial Repair—

HOWARD BARKER, M.D.,
Pontiac, Michigan

THE injection treatment of hernia or the injection of sclerosing solutions into or about the hernial sac has had several cycles of attention. Because of a recent period of enthusiasm for the procedure it is of interest to attempt a comparison of injection treatment with operative treatment.

Attempts to cure hernia by injection are not new. The first period during which this method held some attention began about 1835 and extended roughly to about 1844. During this time Valpeau used iodine solution injected into the hernial sac, and Jaynes, Pancoast and Heaton used tincture of cantharides. There followed a period in which little was published regarding the treatment until 1877 when Schalbe reported good results from the daily injection of 70% alcohol into the inguinal canal. Janney and Warren reported cases in 1880 and 1881-83 which were treated with Heaton's solution. The usual method at that time was to give one large injection. The patient experienced considerable pain with the local inflammatory reaction, so that confinement to bed for 10 to 12 days was necessary. Therefore, the treatment used could not be considered ambulatory.

The next cycle of interest started about 1900 with reports by Manley, Mayer, Lannelongue, of France, and Pina-Mestre, of Spain.

The latest period of active interest in the method began about 1933. During the years 1933-38 some 52 papers on the subject are listed in the *Index Medicus*. However, in the past two years but five articles have been written, suggesting that another cycle of waning interest in the treatment may have set in.

Reviewing the literature on the subject, one is struck by the fact that the more optimistic reports are not supported by any critical analysis of cases. Actual number of injections; length of time over which treatment was carried out; or the period of time which had elapsed after treatment before a given case was considered cured, were recorded in only a few of the more recent reports. A mere statement of the number of cases treated and the percentage of these which are considered cured without specifying the period over which the cases were followed up does not permit comparisons. On the basis of inadequate follow-ups some authors have reported as high as 93 to 96% cures.

During the past 10 years some interesting information has accumulated and instructive reports have been made on the histopathology produced by injection of various sclerosing solutions in animals and in man. Also knowledge has been gained in the selection of cases for treatment by injection, and gradually the types of cases which are considered favorable for injection treatment have been restricted, and complications which may follow treatment have been pointed out.

One of the more frequent reporters on the "Injection Treatment" in the past eight years has been Dr. Carl O. Rice, of the University of Minnesota, and the Minneapolis General Hospital. His reports appear frequently from 1934 to 1939, and his book on the injection treatment of hernia was published in 1937.

The peak of the recent enthusiasm for this method seems to have been reached in the reports published in 1937. In that year Rice reported 379 patients treated for 445 hernia. Of this number 97.6% were reported as cured on the basis that no cough impulse was found on examination six months after the last injection and four months after discarding the truss.

The solutions used were: (1) McDonald's solution —phenol, alcohol and thuja oil; and (2) sodium psylliate—(Syenosol) 5% vegetable oil from psyllium seed.

In his histological studies he found that 15 hours after injections were made into the muscle of dogs the reaction observed was an inflammatory exudate with polymorphonuclear infiltration with a few connective tissue cells. This was followed by a rapid increase in fibroblasts, with a gradual change to mature dense fibrous tissue between the 18th and 42nd days. However, he did not continue the histological studies beyond the 42-day period. More recent work has confirmed his findings that the dense fibrous is formed, and that it is most marked at about six to eight weeks.

ARNHIEM and Neuhof have shown after four months there is a gradual breaking up of the fibrous bundles with infiltration of fat cells between these bundles, and that after 12 to 18 months there remain

only small islands of the fibrous tissue. These late histological changes have been confirmed by other observers, particularly Dobson and Kelly.

From 1939 to 1941, series of cases which have been followed up for longer periods have been reported. In these series the late results have not been as satisfactory as had been hoped for on the basis of the six months' check up.

Dr. Robert Slater, in *New England Medical Journal*, 1939, reported 50 cases started in treatment. Thirty of these did not complete treatment because of pain and the annoyance from the truss. Twenty cases had complete treatment, ages 28 to 75; 10 direct hernia; 10 indirect hernia.

Follow up—two years, all were cured; three years, eight recurrences, 12 cured; four years, 18 recurrences, two cured.

His conclusion was that fibrosis can be produced in the inguinal canal which will give temporary cure of hernia, but that the late results are so unsatisfactory that the method is only indicated in poor operative risks.

Arnhiem and Neuhof, at the Mt. Sinia Hospital, New York, had a total of 24 cases treated by injection under direct vision. An incision about two inches long was made under local anesthesia, the size of the sac was observed and recorded, and injection of 10 to 20 cc. of Syenosol made under direct vision. Only the smaller sac hernia cases were treated.

In 16 cases direct inguinal hernia—10 cured; six recurrences—37% at 22 months after treatment.

In three recurrent hernia (direct hernia)—one cure; two recurrences—66%, 30 months after treatment.

In five combined direct and indirect hernia—four cured; one recurrence — 20%, 23 months after treatment.

Their conclusion, reached on the basis of this work, was that "while some cases of hernia can be cured by this method it has proved to be too uncertain in results to be advocated as a dependable therapeutic practice."

I have attempted rather briefly to bring the subject of injection treatment of hernia up to date in order to form the basis for comparing this method with the better known operative treatment of inguinal hernia.

IT IS NOT within the scope of this paper to discuss the various types of modifications of operations for inguinal hernia. The fact that there are so many modifications of the original Bassini and Halstead techniques indicates that the results have not been perfect.

With all the reports available and the large amount of statistics on the subject, it is still difficult to compare, on a percentage basis, the recurrences in operative and injected cases. Differences in methods of reporting the various series, differences in the length of time that the cases have been followed, or the failure to state specifically the time over which the follow-up was made, all add to the confusion of the figures. To the difficulty in accumulating accurate figures is added the difference in the method of selecting cases for the two types of treatment. The cases in the series quoted for figures on the injection treatment have been rigidly selected, and only those cases with rather small sacs have been accepted for treatment, while those cases selected for operation were not selected on the basis of the severity of the hernia or the size of the hernial sac.

Longacre, in 1939, reported an analysis of 1048 cases treated by operation, but did not follow the same group of cases over a fair period of time. Very interesting conclusions could be drawn from such a series, but still the figures did not lend themselves to comparison. So is it with most series reported.

Iason in his recent book, "Hernia," published in 1941, states:

1. In recent oblique and direct inguinal hernia in childhood and young adults the cures from operation should be about 100%.

2. In recent oblique inguinal hernia in older patients operation should give about 95% cures.

INJECTION

Operator or Source	Number of Cases	Recurrences 6 months	% Rec. 6 months	Recurrences 2-4 years	% Rec. 2-4 years
Carl O. Rice	168 selected	6	2.4%	25	15%
Bradley Coley	58	3	5.2%	47	81.03%
Arnheim Neuhof	24 direct vision	no data	no data	9	37%
Robert Slater	20	no data	no data	18 4 years	90% 4 years
Barker	14	1	7.2%	12	85.7%
Total	284			111	39.08%

OPERATION

Operator	Cases	Recurrences 6 mo.	% Rec. 6 mo.	Recurrences 2 yrs.	Recurrences 1-4 yrs.	% Rec. 1-4 yrs.
Ramos Burtom	150	no data		no data	11	7.4%
Joyce	544	no data		no data	16	2.94%
Weeks	176				1	.56%
Joyce house staff Univ. Oregon	180				13	6.66%
Staff Univ. Oregon	51				2	3.92%
H. Steen	107				4	3.75%
Rountree	73				3	4.1%
Barker	46				3	4.2%
Total	1327				52	3.92%

INJECTION versus OPERATION

Treatment	Cases	Time Followed	Recurrences	% Recurrences
Injection	284	2-4 years	111	39.08%
Operation	1327	2-4 years	52	3.92%

RELATION OF SUTURES USED TO RECURRENCES OF HERNIAS

Type Hernia	Chromic Cases	Chromic Rec.	Chromic % Rec.	Silk Cases	Silk Rec.	Silk % Rec.
Indirect.....	56	7	10.8%	272	6	2.2%
Direct.....	19	3	15.7%	2	4	4.7%
Mixed.....	12	3	25.0%	32	2	5.8%
Total.....	187	23	12.3%	389	12	3.1%

LONGACRE: *Surg., Gynec. & Obst.*, 68:238, 1939.

TISSUE REACTIONS FOLLOWING INJECTION OF SCLEROSING SOLUTIONS

Solution	Necrosis	Acute Inflammation	Early Repair	Late Repair	Fibrosis
Sodium Pysiliate	+ 3 wks.	+++ 1 day	+++ 3-7 days	++++ 2-4 wks.	++++ 1-8 weeks
Mayers	+++ 3 day	++ 1 day	++ 3-7 days	+++ 2-4 wks.	++++ 2-3 weeks
Galtanol	+ 3 day	+++ 1 day	++ 3-7 days	+++ 2-3 wks.	++++ 3-8 weeks
Bratrud's	+ 3 wks.	+++ 1 day	++++ 3-7 days	++++ 1-4 wks.	++++ 1-8 weeks
Carabba	++ 2 wks.	+++ 1 day	+++ 3-7 days	+++ 1-3 wks.	++++ 2-8 weeks

MANOIL: *Arch. Surg.*, 36:171, 1938.

3. In oblique and direct inguinal hernia the cured average between 85 and 90%.

On the other hand Christopher, in his textbook, states that indirect inguinal hernia operated recur in 3 to 7% of cases, while direct hernia recur in from 15 to 30% of cases. He also states that 80% of the recurrences occur within the first year after operation, and 90% within two years after operation. These figures indicate that the recurrences in the injected cases come at a somewhat later date after treatment.

There are undoubtedly a number of factors which determine the frequency of recurrence after operation —the care with which the operation is done; the experience of the operator; type of hernia and the general condition of the patient. These same factors undoubtedly determine to some extent the results from injection treatment.

Several reports from larger hospitals show that the percentage of recurrences after operations done by the residents is somewhat twice that for the staff, in spite of the fact that the less severe cases were assigned to the resident staff. Also evidence is accumulating that repairs done with non-absorbable suture material (chiefly silk) gives better results than that obtained when absorbable material is used. This is probably due to the permanent presence of firm fibrous tissue as the result of foreign-body reaction.

The use of transversalis fascia as an additional layer beneath the internal oblique muscle and the conjoined tendon undoubtedly gives added strength to the floor of the inguinal canal. Although the usual statement is that the aponeurosis of the external oblique muscle attaches to the spine of the pubis forming the upper-margin of the external inguinal ring, in most cases of inguinal hernia this is not true. The attachment is to the pubis well over toward the midline. A single silk suture fixing the fascia down to the pubic spine aids greatly in securing a satisfactory external inguinal ring and in holding the external oblique fascia down more firmly and securely on the internal oblique muscle and the conjoined tendon.

I WOULD like now to summarize the available statistics on recurrence after injection treatment and operative treatment of inguinal hernia:

1. Many solutions injected into the inguinal canal will cause the production of dense fibrous tissue.
2. No preparation has yet been used which will produce a permanent firm fibrous tissue.
3. The failures from injection treatment of hernia far exceed those from operation—about 10 to one.
4. The use of non-absorbable sutures in the operative treatment of hernia will lessen the frequency of recurrence.

Women in Industry

—Placement and Health Maintenance—

MAX R. BURNELL, M.D.,
Medical Director, AC Spark Plug Division, General Motors Corporation

IN TIMES like these, with women by the thousands entering the semi-skilled and unskilled occupations, a discussion of placement and health maintenance among women in industry seems most opportune.

For the past 11 years at the AC Spark Plug Division, we have been actively concerned with this problem. This paper will be confined to that experience.

Proper placement begins with the pre-employment examination. Every female applicant is given this examination whether she is to be secretary or worker on the assembly line. How far should this examination go? We provide the applicant with a gown to wear during the examination; otherwise she is completely undressed. A nurse is in constant attendance. Should pelvic examinations be made on married women? Where there is a history of operations upon the generative organs, or if the applicant has had several children and her work is to be of a more strenuous nature, such an examination is made. Do these women object to this? They do not. On the contrary, in cases where definite pathology has been found, they often return of their own volition to have the condition re-checked. In the field of cancer alone, we have made a diagnosis of early squamous cell carcinoma of the cervix in seven instances; treatment was instituted by the family physician and five of these women have been returned to work. We cite this experience as an example of why we feel that pelvic examinations are often of greatest importance, not only as part of the pre-employment physical examination but the routine check-up examinations as well.

We all agree that proper "placement" goes far beyond the pre-employment physical examination, important though it may be.

With the female employee, we have learned that the emotional adjustment to her new environment is often more difficult for her than the physical adjustment. The influence of the industrial medical department must be carried into the plant if proper placement is to become a fact and not a theory.

How then can contacts best be made between our department and the female employee in the factory?

We have employed two methods which have been very successful: First, the appointment of our senior nurse to the position of "Girl's Councilor," and, second, the establishment of a matrons' service. The Girl's Councilor was given an office away from the medical department where she could be consulted in private and without embarrassment to the employee. The problems that have been brought to that office are far more frequently the result of an emotional maladjustment than a physical disability. Proper placement follows only when such have been corrected.

Dr. Lydia G. Giberson has stated that "at least 25% of a mixed male and female group will be benefited by psychiatric treatment. Full emergency production with its use of marginal labor and its industrial crowding will raise that percentage." Dr. Neil Eckeberry feels that "extensive psychological or psychiatric studies are of no practical value. A study of the job is often more productive of results than a study of the individual doing the job." We have not dignified our consultation service with the term "psychiatric or psychological treatment." However, we feel that Dr. Giberson's viewpoint more nearly coincides with our own experience.

As the number of female employees grew, we realized that the influence of the Girl's Councilor must be supplemented. A matrons' service was then instituted. Carefully chosen older women were placed out in the factory where they were in constant contact with the female employees. It became their job to know every girl in their department. Each matron has become a recognized friend—"someone to talk to." It is the matron who first notices early signs of illness, excessive fatigue or anxiety, and who refers the employee to the medical department or to the Councilor if the disturbance is an emotional one. We feel that the Councilor and matron service is of far reaching benefit and a necessary component part of a medical department serving women in industry.

THE specific problems of maternity, dysmenorrhea and venereal disease have been given considerable attention in the program of health maintenance. How long should an employee work after becoming pregnant, and how soon should she be returned to work following the birth of the baby? We quickly learned that definite rules must apply to office and factory employees alike. Relief from the more arduous operations is immediate, but between the fifth and sixth months of pregnancy all employees are placed on a medical leave of absence. In our opinion the expectant mother should have at least three months at home preceding her confinement. The problem of when the employee should be returned to work is a much more debatable question. We feel that a minimum time of six months should be allowed the young mother to make the adjustment necessary to this new situation in her life.

Mr. William S. Knudsen became interested in our problem several years ago and, in honor of Mrs. Knudsen, established "The Clara Elizabeth Fund for Maternal Health." Not only do our employees benefit by his generosity but all expectant mothers in our community also now receive instruction in proper pre-natal care. Even the expectant fathers attend classes and exhibit with pride their certificate of "Prepared Parenthood." The maternal morbidity and mortality have promptly dropped. With Mr. Knudsen's help, we have gone a long way in "Health Maintenance" so far as maternity is concerned.

The problem of dysmenorrhea is a real one. It cannot be eliminated entirely, but much can be done to lessen lost time from this source. We have provided a ward in our hospital where women employees are encouraged to come with the first appearance of symptoms. Rest, local heat and simple medication soon return the majority to their work. A regime is outlined for the intra-menstrual period of supervised postural exercises; advice as to the necessity of proper clothing; proper elimination of the lower bowel directly preceding the expected period, etc. The attention of the family physician is drawn to the more severe cases. We do not make pelvic examinations in this instance, for most of those suffering the severer types of dysmenorrhea are unmarried.

Dr. James Townsend is of the opinion that "venereal disease is a public health problem and not an industrial problem any more than it is a white collar problem or a business class problem. The objective of the serological survey or of the routine physical examination is to get more persons with early gonorrhea and syphilis under treatment." We agree with that opinion. However, if we were asked to make an appraisal of the confidence that the employee has for the industrial medical department we would suggest that it could be answered by the number of employees asking advice of the industrial physician or nurse about venereal disease. Early treatment is necessary for health maintenance. A neglected case especially in a female employee endangers herself and is a menace to those with whom she works.

The matron in the rest room and the nurse in the hospital keep a careful watch for early symptoms of venereal disease; but we are particularly gratified when the employee herself requests advice. A note from the family physician stating that she is under treatment is our only requirement for her to remain at work. Realizing that the medical department is interested solely in her health and not in her indiscretions, the employee is increasingly cooperating in this difficult phase of public health.

We realize fully that many of the procedures outlined in this discussion are controversial. We can state, however, that our women employees have definitely benefited by this program.

The Substandard Worker

—Physical Examination and Placement—

P. J. OCHSNER, M.D.,
Medical Director, Fisher Body Division—Lansing, General Motors Corporation

THE placement of workers, especially those who have defects or disabilities in no way related to their work but which might be aggravated by such work, is receiving increasing attention from employers and management, from organized labor and from government. Placement of these individuals must be based on physical and mental standards. The industrial physician's primary interest in these problems is the effect these physical defects have on these employees, and also their correction, if at all possible, for the good of all concerned.

These groups, management, labor and government, have diversified points of view as to the requirements for work. Management is primarily interested in production and costs, labor in jobs, working conditions and wages, government in harmony between the two groups.

Proper placement depends not only on physical and mental standards but also on intelligence and skill, which are all inter-related.

The responsibility of industry for injuries and occupational diseases sustained by employment should be a stimulation to industry to make provisions for the health and protection of employees in regard to their proper and safe placement in the plant. Although a healthy body does not always mean a safe one, it is a vital link in preventing occupational hazards.

This problem of job placement, especially as to the substandard worker, gains greater difficulties as the personnel in any plant becomes older. In the last 40 years preventive medicine has raised the average age so it exceeds 63 years, whereas, at the turn of the century it was 47 years. The 1940 census reveals that the population increased 7.2% since 1930, but the number 65 years or over increased 35%. Now very few workers of this age are healthy. Many suffer from the degenerative diseases. These are the men who are difficult to place and whose increase will be a potential menace to our economic and productive abilities, unless we can use and place them according to their capacities and physical condition. In our particular plant we try to place these senescent employees with disabilities, who are not physically qualified to do moderate work, on jobs such as elevator operators, sweepers, janitors, light hardware operations, small assembly, and salvage. I imagine, even under our defense set-up, there will be still some jobs available for these men.

Just a short time ago, during one of our recent heavy snowfalls, it was necessary to call in some workers for snow shoveling. This operation comes under yard work in our seniority records, and yard work is included with the sweepers and janitors. So, in checking the physical and seniority records to determine who should be called in, we found that the first 20 men who were entitled to the job on seniority were between 56 and 70 years of age, the greater majority in the 60-year group. All these men had some type of disability or defect which prevented them being called on this particular job, yet the committee representing labor can not realize why these older men could not do snow shoveling. We all know, however, they could not do a

day's work of this type without physical strain and, in all probability, damage to their physical condition. It seems to me that the medical department's judgment should be final in these cases and not open to arbitration between labor and management. After all we are looking out for the employee as well as management in trying to place these men properly. It is extremely difficult at times to satisfy management that the employee in question can do a day's work and labor that we are not discriminating against their cause. There are jobs in every plant that can be safely handled by these men, for, as the speed of reaction is lowered with age, there usually occurs a compensatory increase of endurance.

THE emergency of increased defense production will entitle the recall first of our older employees. Their proper placement is vital to maintain production without lost time in order to win this war. Many of these men have important potentialities as teachers of new employees in the skilled trades, but the rest must be placed on light small assembly work.

The medical departments of industry, as advisers to management, must have basic information on which to guide placement, and this is obtained through our periodic health examinations. These examinations require more than a hasty and superficial physical. All too frequently nothing is gained from the examination but a written record which is filed away and forgotten. Labor will be less resentful if it sees the direct benefits of better health of its members, and management more willing to stand the expense if assured the results attained will be applied to further better health and placement of employees.

The periodic health examination should not only detect but also remedy defects. That preventive medicine is effective has been demonstrated by the longevity and health of those insured workers who have taken the opportunity of periodic examinations made available by some of the larger insurance companies.

The medical department can assist management and the employees in better placement by keeping perpetual records of physical disabilities of its plant personnel, checking with the employment department that the status of each employee is not changed or transferred without authorization from the medical department. These men must be placed on jobs commensurate with their capacities, all of which requires a knowledge of the job on the part of the medical and personnel departments.

One of the most intricate problems we must consider is the employee who has sustained a serious disabling injury followed by mental shock and long convalescence, during which he has been a victim of fear and doubts, probably stimulated by friends and relatives. These sometimes change the employee's attitude to his job, his employer and the medical department. These individuals are much better to be on light work as soon as possible, so that their mental attitude can be relieved by occupation and medical advice.

The majority of permanent physical impairments are due to accidents, but these accidents are either in the home or on the highway. Men in the plant are relatively safe, owing to the splendid safety movements in industry. It has been my personal opinion that the motor industry has been very generous toward the employment of the physically handicapped worker. We have men working every day who have been maimed by loss of a leg by accident, also those with defects, such as carcinoma, coronary disease, cardiorenal disease, diabetes, hypertension, and arrested tuberculosis, who are all earning a day's wage and performing a day's work with apparently no harm to themselves or to those about them.

Industry has learned through experience that the most satisfactory workmen are those who are healthy and physically capable, especially when on jobs they like and can do. This does not infer that we should reject all who are unhealthy or maimed, for there are jobs in almost every plant that those of substandard health can do to the profit of their employers.

We do not dicriminate against persons previously in our employ who contracted tuberculosis and have become arrested from their disease. We do, however, give considerable thought to their placement and follow the advice of the director of our county sanitarium. These individuals should be placed on jobs free from extremes of temperatures, irritating gases or work under high pressures. They should be followed closely by periodic examinations in order to prevent a recurrence after returning to work.

The worker disabled by heart disease all too often, but naturally, lays his condition to trauma or the activity of his occupation. It appears to me that industry should not be held liable for coronary or vascular accidents occurring while the worker is performing his usual routine job with no unusual effort. But if these vascular accidents are associated with exertion or trauma it is practically impossible to dismiss them as non-occupational in origin. These substandard employees must necessarily be placed on light work away from toxic substances, jobs requiring oxygen deficiency, extremes of temperature, and exertion. It is only in the last 10 years that the clinical recognition of coronary disease has become so vital to the industrial physician, to decide where to place this type of substandard worker and whether work would aggravate the susceptibility to further attacks of angina, heart failure or possibly death. This has caused a wide diversity of opinions. Just a few years ago coronary disease labeled an individual a total and permanent disability, but of late it has been pointed out that many of these cases recover completely and remain in good health for years. We have quite a number of these employees working very day with no embarrassment, whom I have followed for a period of five to six years. Some of the older men complain of angina at times but are no worse at work than while at home. These men should be observed constantly for abnormal symptoms.

We also should group our luetics in the substandard classification, as they must be placed properly, especially those of the nervous and cardiovascular type. These workers should be checked more often than the general run of employees because lapse of treatment destroys in a good many instances what has been accomplished in line of therapy. It is important for the industrial physician to know and appreciate which type of latent syphilis may be expected to affect productive efficiency. It is said that workers subjected to heavy physical strain are more than twice as liable to develop late cardiovascular lues as those using mild physical effort.

WHILE industrial accidents and occupational disease have received the greatest share of our time and thought, it is becoming apparent that employee lost time on account of non-industrial diseases and accidents is a larger and more important drag on operating efficiency because of the delay and time necessary to replace the missing worker. With females coming into our defense set-up in larger numbers, this is a vitally important part of our duties. We should try to cut down this lost time, which is so essential and vital to our country in this time of emergency.

RESPIRATORY DISEASES	NON-RESPIRATORY NON-DIGESTIVE DISEASES
Influenza	Heart
Nasal fossae and annexae	Hemorrhoids
Bronchitis	Other circulatory diseases
Pharynx and tonsils	Genito-urinary diseases
Pneumonia	Neuralgia, neuritis, sciatica
Respiratory tuberculosis	Other nervous diseases
	Organs of vision
DIGESTIVE DISEASES	Ear and mastoid process
Teeth and gums	Rheumatic diseases
Stomach—except cancer	Lumbago, myositis, etc.
Diarrhea and enteritis	Skin diseases
Appendicitis	Infectious and parasitic diseases
Hernia	Cancer

IN REVIEWING the statistics of the frequency and severity of non-occupational sickness and injury cases during a 12-month period in 1940 at our plant in Lansing, we concluded that lost time from these causes is tremendously higher in female employees as the figures I am about to state will show.

This survey included 3,219 hourly-rated male employees who had 270 reportable cases of seven days or over of non-occupational disease and injury; 9,751 calendar days were lost by this group of men, with 2,326 calendar days lost by respiratory diseases, 2,475 days lost by digestive diseases and 3,495 days lost by non-repiratory non-digestive diseases. And 1,389 days were lost by non-occupational injuries.

In the group of 412 hourly-rated women employees, we had 117 cases of seven days or over of non-occupational disease and injury, with a loss of 5,013 calendar days—926 days were lost by respiratory diseases, 807 days by digestive diseases, 2,004 by non-respiratory, non-digestive diseases, and 1,055 days were lost by pregnancy, with 221 days lost by non-occupational injuries. The highest number of days lost in the female workers was in the genito-urinary, non-respiratory and non-digestive classification, which was 2,004 calendar days. This was nearly half the total calendar days lost. When we compare percentages, the female employees had 20% more cases of non-occupational injuries and diseases than the male employees, a very decided and important factor in the study of lost time.

Because of the physical differences between men and women, industrial working women are exposed to health hazards which do not seriously affect men. Women have less power to resist conditions which break down health, i.e., long working hours and fatigue. It is a great deal more important to place female workers in suitable jobs because of their physical differences and constitutional make-up.

We, as industrial physicians, should perform a complete examination on these female workers in order to uncover defects and diseases that contribute to inefficiency and lost time. Industrial physicians must study both their workmen and workwomen from the standpoint of the relation of the job assigned to their physical and mental condition. In no other way can we qualify to assist in placement.

In closing, let me stress that the physical examination, pre-employment and periodic, should not have as its purpose the disqualifying of all those with physical defects, but rather should be used to aid them in finding their proper places in industry. If this is done properly, the employer will be protected in most cases. This requires a thorough knowledge of plant activities, plant hazards, and job requirements by the plant physician.

AMERICAN ASSOCIATION of INDUSTRIAL PHYSICIANS and SURGEONS

President's Address

Cincinnati, April 14, 1942—
—Twenty-seventh Annual Meeting,

T. LYLE HAZLETT, M.D.,
Medical Director, Westinghouse Electric & Manufacturing Company, Pittsburgh

TODAY we officially open the most important meeting in the 27-year history of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS. And I am sure that our loyal friends and helpers, the hygienists, will heartily agree that this statement stands for the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION as well. Today's news makes this true with America waging a total war, a war of fighting men, a war of machines and a war of workers who make the machines that reinforce the fighters.

In the eventful, crowded year since our last meeting, we have changed over from an economy of peace and defense to one of war and offense—to a nation waging war around the world. Today "conversion" to war work is the by-word. Our industrial tempo is quickening hourly. America is swinging into a production program the like of which the world has never dreamed —a job so gigantic that it dwarfs to insignificance our proud accomplishments of the past.

Our Association has been a part of the industrial growth of our country since its inception. A small group at the beginning visualized the future, and to them much credit is due for their high ideals and steadfastness of purpose which carried us through many years—part of the time as an undernourished child. A transitional period often times is necessary in many organizations, and through which they must survive. For us there was constantly the guiding beam, the ultimate goal — the conservation of man power within our industrial units of society.

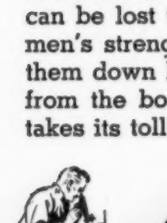
Do we appreciate our grave responsibility in this hour? We are the medical field marshals for the Army of Production. These men who fight behind the lines in mines, mills and factories cannot go on losing an average of eight days per year because of illness. Occupational accidents claimed approximately 20,000 lives last year, a gain of 8% over 1940; non-fatal injuries totalled about 1,750,000, a 14% increase. The Gallup Poll estimates that throughout the United States 24 million man-hours of work were lost because of illness in the four-week period of last November 24 to December 20. This is in approximate agreement with findings from the study of sick absenteeism which is being made by the Industrial Hygiene Foundation and the United States Public Health Service and in which our Association is collaborating.

This opens the field of preventive medicine as never before among our industrial workers and at a time when every man-hour is so vital to our war efforts. Thus is provided greater opportunity for us of this organization to do research; to increase health educational efforts; to control working environment, fatigue, nutrition and the placement of the worker in the occupation for which he is suited both mentally and physically; the prevention of accidental injuries and the rehabilitation of those injured in line of duty.

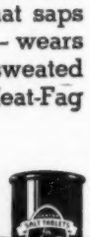
The new worker, both male and female, unfamiliar

"I AM HEAT-FAG. I attack workers who sweat — who lose body salt and then don't replace it. Through fatigue and inalertness, I make them 'drop their guard'—I not only spawn... I cause accidents."

Heat-Fag is the all-out, unseen enemy of production. Thousands, yes, millions of precious man-hours can be lost through this insidious force that saps men's strength — lowers their efficiency — wears them down before the shift is over. Salt sweated from the body must be replaced — or Heat-Fag takes its toll.



AVOID HEAT-FAG—USE
MORTON'S
SALT TABLETS



QUICK DISSOLVING (less than 30 seconds)
This is how a Morton Salt Tablet looks when magnified. Examine one—see how soft and porous it is inside. When swallowed whole — with a drink of water, they dissolve in less than 30 seconds.

Wherever workers sweat, Salt Tablets are needed, for they represent the simple, easy way to replace salt that's lost through sweating and hot work.

Case of 9000 10-grain salt tablets **$2.60**

Salt-Dextrose Tablets, case of 9000 **$3.15**

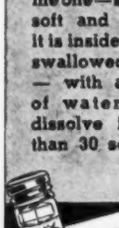
Order from your distributor — or directly from this advertisement.

Place MORTON'S DISPENSERS at all Drinking Fountains

• • •

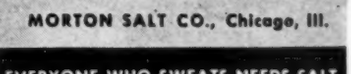
They deliver salt tablets, one at a time, quickly, cleanly—without waste. Sanitary, easily filled, durable. 500-tablet size, $3.25. 1000-tablet size $4.00

MORTON SALT CO., Chicago, Ill.



FREE Sample Tube
Write—on your firm letterhead — for a pocket size sample tube of Morton's Salt Tablets and for the new folder — "Heat-Fag and Accidents Ride Together."

EVERYONE WHO SWEATS NEEDS SALT



with industrial practices, presents another difficulty. The War Production Board says that about 10 million more workers must be put into war production this year. Two million of these must be new workers, men and women not now engaged in industry. As some manufacturing materials grow increasingly scarce and substitutions are pressed into service, we meet new problems. Substitutes, especially the chemicals, may be more toxic. In all cases of substituting materials we leave off handling a substance we know how to control and take on a stranger. The many chemical compounds being hastened into service in war manufacture are presenting a no-man's-land of toxicology.

The employee, as the employer, must be brought more directly into industry's health program, which upon extension, becomes a public health program. Safety cannot be achieved without the active participation of the workers; neither can employee health be improved unless the worker does his part. It is up to us to tell him what his part is and to help him do it. And in this the supervisory force has its role.

If we face great difficulties, so do we face great opportunities. This Association was planted in the last war. It will bear fruit in this one! We are now fortified by 12 component societies. We have a combined membership of 1,239 which includes 280 Fellows. Sixty new members affiliated this year.

I am happy to report that much progress has been made in stimulating and guiding the training of those who are to follow us. The Association's Committee on Medical Education has been most active. Your Board of Directors met three times during the year notwithstanding the increased pressure placed upon all of us.

Our Managing Director has lavished time and energy on the affairs of our Association, and I desire to express our appreciation for his constant efforts during this past year. Under such auspices we have a greater opportunity for disseminating information to our entire membership as well as affording a wider scope for organization activities both to the individual members and to our component societies.

It has been most gratifying to note the response and the willingness of all who have served on various committees throughout the year.

In the minds of some of us the question arose as to the advisability of this meeting. The interest displayed and the attendance effectively answer the question.

But in the words of Donald Nelson, "We must realize the value of time." This meeting is no vacation. It is a time for work, facts, and plain talk. Americans are fighting and dying somewhere out there. Not a man here dares miss an opportunity to gain the maximum benefit from this meeting. We must return to the industrial front amply fortified by the time spent here and armed with the latest information needed to help do our part in that production job, the like of which was never conceived in world history.

Time prevents mentioning the scope and work done throughout the year by our various committees. Their reports will be published in forthcoming issues of INDUSTRIAL MEDICINE. I hope you will consider them carefully. Valuable contributions have been made to industrial medicine, thereby reflecting to the credit and purpose of our organization. Our responsibility and our organization challenge us as never before to stimulate and guide the application of medical science among our gainfully employed, including management. We must present an ever widening horizon in preventive medicine, which is imperative in this national emergency, and which will directly influence the continuation of our American way of life—Opportunity For All.

Industrial Medicine
Reg. U. S. Pat. Off.

The Journal of Traumatic Surgery and Occupational Diseases

Established 1932

Executive, Editorial, and Publication Offices:
540 No. Michigan Ave., Chicago.

Editor: C. O. SAPPINGTON, M.D., DR. P.H.

Associate Editors:
O. A. BRENENSTUHL, M.D.
JAMES T. CASE, M.D., F.A.C.S
VOLNEY S. CHENEY, M.D., F.A.C.S.
BRADLEY L. COLEY, M.D., F.A.C.S.
HART E. FISHER, M.D., F.A.C.S.
OTTO P. GEIER, M.D.
EMERY R. HAYHURST, M.D.
WILLIS W. LASHER, M.D., F.A.C.S.
ROBERT T. LEGGE, M.D., F.A.C.S.
CHRISTOPHER LEGGO, M.D.
OSCAR L. LEVIN, M.D.
WM. D. MCNALLY, M.D.
M. N. NEWQUIST, M.D.
FREDERICK W. SLOBE, M.D., F.A.C.S.

Publisher: A. D. CLOUD.

Advertising Manager: STEPHEN G. HALOS.

Volume 11 **JUNE, 1942** **Number 6**

Workers A.W.O.L.

FOR a long time to come there will be no contribution to the literature of employee absenteeism more significant than that of MR. COURT (pages 271-275, herein). On the basis of statistics, carefully compiled from the separate large plants of a huge industrial corporation, and expertly evaluated as to comparisons, he shows that there are many more causes than the much-accused common cold and dental conditions; that some of these causes have deep roots, extending even to origins rather on the mysterious side because of the lack, so far, of reasonable explanation; that others derive from non-habitual impacts upon the personal equation; and that "economic considerations, specific fiscal arrangements, and the point of view of the community seem frequently to play as important a role. . . . as do strictly biological forces."

MR. COURT'S analysis is precise, factual, direct, and, in the present emergency, most timely. He concludes that, in the aggregate, the problem of absenteeism needs "general coordination of policy"—medical and management, human and scientific; that the solution can never be full and final; that the best possible will be a "reasonable level." And he leaves no doubt that the attainment of such a level will require the continuation and enhancement of the utmost efforts of every contributor—including the executive, the physician and, yes, the employee himself." But even the utmost of supervisory and professional skill cannot overcome the lack of incentive. The reader whose desire for victory is really "all-out" to the extent of his own complete subordination of selfishness will not have to think very far to perceive that unnecessary absenteeism from the Army of Production may be as hurtful to the cause of victory on the worker's part as being A.W.O.L. from the Army of the United States may be on the soldier's. The soldier is subject to penalty in the one; the money and materials are regulated in the other. An old Spanish ballad, from the sixteenth century, describing the raising of a great cathedral, has the lines: "Ten times ten doubloons the builder daily for his hire received. If an idle day he wasted, ten times ten doubloons he paid."

The 50-Hour Week

IN A DISCUSSION period at the Cincinnati meeting in April, some of the industrial physicians who were present remarked, regarding the 50-hour week, that it was not particularly injurious to mental or physical health. These remarks started a wave of newspaper comment, mostly editorial. One of the best of the comments is the following from *Indianapolis Star*, May 21:

"It should not require a session of the American Psychiatric Association to reject the theory that the 50-hour week might produce impaired efficiency and nervous breakdowns. Dr. Arthur H. Ruggles, president-elect of the organization, said he had been looking for a case of mental breakdown caused by overwork or overstudy and had yet to find one. 'So far as I know,' he continued, 'there is no scientific evidence to show that a 40-hour week is better for mental health than a 50-hour week. Yet for the last decade we have heard nothing about the dignity and value of a long week's work.' The psychiatrists intimated that many cases where breakdowns in health occur are due to combining hard work with too much alcohol, too little sleep, insufficient diet, unwholesome working conditions and worry. This point of view confirmed the report of a group of industrial physicians who met in Cincinnati last month to consider industrial working conditions. Those specialists recommended a standard work week of 50 hours. The members of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS and the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION declared that 'Purely from a production standpoint, and without regard to any of the real or artificial demands of labor or capital, it has been found that a 50-hour week, and not more than 58 hours, is the prime operating time of workers.' The public has no desire to impose a longer work week, except as such change may be necessary to win the war. The shorter week was adopted as a means of spreading employment and permitting additional leisure, thus raising living comforts. The five-day week has been standardized in normal industrial enterprises. There is little to indicate that a concerted effort will be made to restore a longer work week for normal peacetime production. The assumption that health would be impaired by longer hours, however, is foolish. *The shorter schedule should be indorsed as a contribution to the American way of life and not disguised as a health measure.*" (Our italics.)

The Railway Surgeons

NO ONE need inhibit his plans for the Fifty-Third Annual meeting of the AMERICAN ASSOCIATION OF RAILWAY SURGEONS, Palmer House, Chicago, September 10, 1942, for fear of restrictions on travel or exhibit material. Whatever the exigencies as to either, Chicago is the one convention center where they are least felt. As to the program itself, it is already far enough developed in the practical values now so urgently needed as to make *this* convention a "meeting must."

The Metabolism of Fluoride

WILLARD MACHLE, E. W. SCOTT, E. J. LARGENT,
Kettering Laboratory, College of Medicine, Cincinnati, Ohio

THE fluoride ion is toxic and may cause acute illness resulting in death. Recently occurring instances of accidental ingestion have occurred in Pittsburgh and San Francisco with 11 deaths (52 ill), and three deaths (11 ill) respectively. Chronic intoxication may occur in man or animals; in the case of the former it may be of industrial or non-industrial origin. The principal source of industrial fluoride intoxication is the cryolite industry; the resulting disease being called fluorosis.

Mottled enamel, a growth of dyscrasia of the permanent teeth may result from the continued ingestion, in childhood, of drinking water containing more than 1 ppm of fluoride. Mottled enamel is of world-wide distribution.

Darmous, gaddur and malacia are diseases of animals, caused by ingestion of forage contaminated with fluoride. The bones and teeth are mainly affected; the condition is common in some geographic areas.

Subject matter of the Second-Prize Scientific Exhibit. Twenty-Seventh Annual Meeting, AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS and Third Annual Meeting, AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, Cincinnati, April 13-17, 1942.

CLINITEST
THE NEW
TABLET URINE-SUGAR TEST
IS AS EASY AS THIS:

1 5 Drops Urine *plus* 10 Drops Water

2 Drop in Tablet

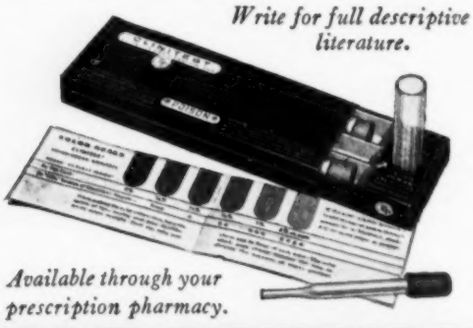
3 Compare with Color Scale

ELAPSED TIME— Less Than One Minute!

RELIABLE—The CLINITEST Tablet Method employs a modification of the well-known copper reduction method of Benedict, retaining the familiar progression of colors from blue through green to orange, indicating sugar at 0%, ¼%, ½%, ¾%, 1% and 2% plus.

ECONOMICAL—Complete set (with tablets for 50 tests)—costs your patient only $1.25. Tablet Refill (for 75 tests)—$1.25.

Write for full descriptive literature.



Available through your prescription pharmacy.

EFFERVESCENT PRODUCTS, INC.
ELKHART, INDIANA

Conclusions

FLUORIDE is a normal component of the earth's crust and of foods and waters.

2. The amounts of fluoride normally ingested are excreted almost entirely in the urine.

3. With a normal level of intake from dietary sources, urinary and fecal excretion equals intake.

4. This equilibrium between intake and output is maintained when the daily intake and absorption of fluoride does not exceed 1 mg.

5. With higher levels of intake and absorption the urinary fluoride excretion increases.

6. The magnitude of urinary fluoride excretion varies directly with the amounts absorbed.

7. At high levels of fluoride intake and absorption, storage occurs even though there is increase in excretion. (Storage occurred when the daily fluoride absorption was 2 mg. or more.)

8. The magnitude of storage of fluoride varies directly with the absorption.

9. Since both urinary fluoride excretion and fluoride storage vary directly with absorption, they are correlated.

10. Urinary fluoride excretion may therefore be used as a measure of fluoride storage.

11. The absorption of fluoride is dependent upon the aqueous solubility of the fluoride salt and its state at the time of ingestion.

12. In experimental animals, bone abnormalities were associated with the storage of large amounts of fluoride in the bones without the appearance of roentgenologic changes or illness.

Experimental Studies

RESULTS of analyses of food and water are tabulated. Soils may contain as much as 6000 ppm of fluoride. Foods range from 0.20 ppm to 4.5 ppm. Tea, certain processed foods, and bone products often contain much more.

2. Comparison of the magnitude of the urinary and fecal fluoride excretions obtained during the balance study, shows that under normal conditions, over 90% of the fluoride is excreted in the urine.

3. While on normal diet, the daily intake of fluoride in all food and liquid was studied by means of duplicate samples, using a human experimental subject. All excretions were collected and analyzed. Results for a 20-week period are given. These are representative of other similar periods.

It may be noted that intake and output balance within the limits of analytical error.

4. The mean normal intake of fluoride as determined by random samples of urine collected throughout North America is at least 1 mg. per day. Intake of this order of magnitude was not associated with storage in our experimental subject. Fluoride, how-

ever, is a normal constituent of human tissues, the greatest amounts being in the bone as can be seen from the tabulated results of analyses.

5. With increased absorption of fluoride, great increases in urinary fluoride excretion can occur. Concentrations as high as 23 mg. fluoride per liter of urine have been observed from industrial exposure. Excretions of 12 mg. fluoride per liter have resulted from the ingestion of fluoride-bearing water.

6. At increased levels of absorption, there is a change in the ratio of absorption to urinary fluoride excretion. In the case of our experimental subject, in the ranges of absorption of from 2 to 19 mg. fluoride per day, the relationship between absorption and urinary excretion can be expressed as a straight line with a slope constant of 0.532.

7. When from 2 to 19 mg. fluoride were absorbed, about half was excreted; the other half was stored. Amounts stored were not liberated and excreted after intake was reduced to normal, as can be seen from the data presented. From clinical studies, analytical data on human necropsy material and from animal experimentation, we may infer that the storage occurs almost entirely in the bones.

8. The relationship between the magnitude of absorption and storage of fluoride can be expressed as a straight line having a slope constant of 0.468.

9. The association between storage and urinary excretion of absorbed fluoride when expressed graphically is a straight-line relationship within the limits indicated.

10. Since urinary excretion can be used as a measure of fluoride the possible limits of error were determined. These limits are proportionately large at the lower levels of absorption but are not of practical clinical significance when larger quantities of fluoride are involved. The maximum deviations from the expected 1:1 ratio (y equals x) that we encountered are listed. Unmeasured losses of fluoride in perspiration explain in part the two more widely aberrant results which were obtained during the hot months.

11. Even the less soluble of the fluoride salts are readily absorbed when administered in solution. It may be noted that large amounts of calcium given with fluoride (in bone meal) caused the greatest reduction in absorption.

12. Fluoride feeding experiments carried out with female rabbits (litter mates) established that the fluoride content of bones could be increased from normal levels of 0.1 to 0.2 gm. per kg. to levels of 11 gm. per kg. without observable roentgenologic changes, though the bones were abnormal in other respects.

HEAT can sabotage production . . .

Keep your workmen in top form during hot weather with Walker's Dexaline—the improved salt tablet. Each tablet contains not only 7 gr. sodium chloride (to prevent dehydration), and 3 gr. dextrose (to increase sugar energy level) . . . but also 1 mg. vitamin B_1 (specially helpful in protecting against heat exhaustion). Economical and effective. Write for samples and literature.

WALKER VITAMIN PRODUCTS, INC., MT. VERNON, N.Y.

DEXALINE

You CAN Have Both—
QUALITY and ECONOMY
THE PREFERENCE of so many industrial surgeons for Crescent blades reflects a keen appreciation of the unique qualities that enable them to achieve such clean, effortless incision.
Extra initial sharpness, and a stubborn resistance to service-wear, are assured by the longer, sharper bevel to which the cutting edge is ground.
Extra rigidity is built in every blade by the use of one-third more of finest surgical steel.
Extra sensitive balance is achieved by an even distribution of weight, without thinning down from back.
Furthermore, by specifying Crescent blades, the industrial medical department or hospital can save up to 30%, depending on the quantity ordered. These superior blades are actually less costly than any others on the market today!
Use the coupon for liberal samples.
CRESCENT SURGICAL SALES CO., Inc.
NEW YORK, N. Y.
Fit all standard handles
Crescent
SURGICAL BLADES AND HANDLES

Crescent Surgical Sales Co., Inc., New York, N. Y.
Gentlemen: Please send samples of Crescent blades for trial.

Name.....

Company.....

Address.....

City.....

INDUSTRIAL HEALTH and DISEASE

Milk in National Health

An Interview with

PROF. E. B. HART,
Chairman of the Section on Biochemistry, University of Wisconsin

IF YOU had to choose a single food on which to live for the rest of your life, your wisest possible choice would be milk. That's the opinion of E. B. Hart of the University of Wisconsin biochemistry department. Milk is the only food which, without any help from other nutrients, could still give a healthful, balanced diet, he explains.

From *Wisconsin Med. J.*, May, 1942.

Of course the regular diet of milk, day after day, would have its disadvantages. It would get tiresome like any other one-food menu. But people have followed that ration for months at a time with satisfactory results.

On the University of Wisconsin campus selected students have followed an all-milk diet for six-month periods, with only copper, manganese, and iron added. At the end of the experiment they have invariably been in as good or better physical condition than at the start. And while the record is being compiled, there's an authenticated case of a woman following an all-milk schedule for more than three years and retaining perfect health.

The significance of these tests is not the indication that milk can be an independently self-sufficient food, Hart points out. Their importance lies, instead, in the fact that they show what milk can add to any menu. Whatever the dietary deficiency, milk can usually contribute to its correction.

It isn't right to say that milk has every needed food element. It is lacking in copper, iron, manganese, and vitamin D, and all of these food elements are especially needed by children and adolescents. But down the rest of the score card, through minerals and vitamins and proteins and fats and carbohydrates, milk qualifies.

Let's follow the score card through, starting with the vitamins.

"All the vitamins are present in milk in adequate quantities except vitamin D, and this can be added by several well-known practical methods," Hart observes. "The content of B-complex vitamins is fairly abundant and also constant, due to the synthesis of these substances in the rumen of the cow."

In tabular form, here are the vitamins needed by man, together with the share of them supplied by milk:

The Vitamin	*Its Characteristics*	*How Milk Qualifies*
A	Oily, transparent, and fat-soluble. Helps maintain resistance to infection, promotes normal growth and normal teeth formation. Aids in maintaining highly accurate vision.	Milk is a good source, and particularly so if the cowa have been fed a supply of vitamin A-producing feeds. Such feeds, in common use among Wisconsin dairymen, are legume silage, pasture and green leafy hay.
D	Necessary to proper use of calcium and phosphorus in the body. Consequently, it helps insure against poor bones and teeth.	Normally milk carries a negligible amount of this vitamin. Irradiated milk, however, is an excellent source.
C	Water-soluble. Important to the formation of supporting body tissues. Essential to proper maintenance of bones, teeth, and gum structure. Scurvy preventive.	Milk is an excellent source, a quart of milk offering up to a third of the normal day's needs.
Thiamin (B1)	The much-publicized "vitamin of morale." Essential to growth, carbohydrate utilization, and general health of the nervous system.	Milk is a superior auxiliary source. A quart of milk has from 0.3 to 0.5 mg. to the quart. Man needs 1.5 to 2.3 a day.
Riboflavin	Helps insure normal growth, skin health, and nerve structure. An enzyme in tissue respiration.	An adult needs 2 to 3 mg. daily. A quart of milk offers from 2 to 2.5.
Nicotinic acid (Niacin)	The antipellagra factor. A stable vitamin associated with skin health, digestion and nervous stability. Deficiency symptoms are nervous disturbances, diarrhea, skin disorders, and even pellagra.	Milk is less valuable than meats, for example, as a source of niacin. But a quart of milk can still supply up to a fifth of the daily needs.

The vitamin A in butter and cheese has a dramatic role in the present war, for RAF pilots in England follow a careful vitamin-A-rich diet to improve their eyesight for night flying.

Citrus fruits, tomatoes, and some other vegetables are important sources of vitamin C, but conditions seem to indicate that during the winter season a good many Americans who do not get these foods finish the year with cases of incipient scurvy. A quart of milk a day would go far toward correcting this situation.

Analyses for such vitamins as pantothenic acid, biotin, inositol, folic acid, and others have not yet been completed, nor has the function of these vitamins been completely clarified. However, in all major vitamin fields milk is important, and it seems likely that it will measure up equally well in these others.

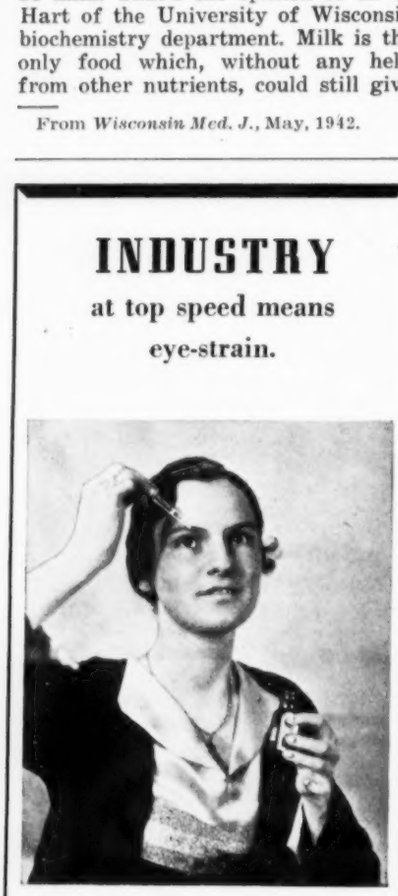
Vitamins are of enormous importance to human health. But with the emphasis vitamins are getting in newspaper items, magazine articles, and food advertisements, the American public is beginning to believe they are the only food elements a person needs.

Nutritionists and physicians are not led astray. They know that there are other important food elements: minerals, sources of energy, and supplies of complete proteins. And nutritionists and physicians recognize that in these departments milk stands near first place.

What are the minerals man must have? Well, let's see. Hart lists calcium and phosphorus for the teeth and bones, copper and iron for the blood stream, manganese, a reproduction factor, and all five for muscle-building and general body health.

Calcium and phosphorus, the bone-builders, appear abundantly in milk. Milk alone may not always supply enough phosphorus, but it always goes a long way toward filling the needs of that mineral. And for calcium, dairy products are a *must*. Calcium is not nearly so abundant and easily

INDUSTRY
at top speed means
eye-strain.



ALKALOL
then becomes a very
valuable defense agent
in your factory.

We have a convenient
eye dropper sample
to send you on request.

THE ALKALOL COMPANY
TAUNTON, MASS.
Write for free sample
ALKALOL
ALKALINE · SALINE · CLEANSING

available in other major foods, as the traditionally poor teeth of the American people amply testify.

An adult needs about a gram of calcium daily, a pregnant or nursing woman requires up to two, and a child must have at least a gram or more. Milk supplies over a gram to the quart, and so the secret of good teeth and strong bones is inextricably tied up with dairy foods in the diet.

Copper and iron, important in blood-building, and manganese, which affects reproduction, do not appear in quantity in milk, primarily because milk is the natural food for the suckling young. The infant child or young animal is well-supplied with a large enough reserve of blood-building elements to last until he is old enough to turn to a natural copper or iron-supplying diet. But for the youngster, once weaned, until he has completed his years of growth and development, these minerals are vital. And though they are absent from milk, they appear in abundance in many green vegetables, and so should offer no danger of deficiency.

Iodine is an important mineral whose presence in the milk is dependent on the diet of the cow. It can be made to appear, if the cow is fed iodized salt or inorganic iodine. This process is practical, but unnecessary so long as iodized salt or sea food can fill the iodine needs easily.

Vitamins and minerals protect the body from infection and disease, at the same time supplying some materials for bone, tooth, and blood formation. Now another food constituent enters the picture: proteins, which provide material for the formation of strong muscular tissues.

Casein and lactalbumin are the significant dairy proteins, according to Hart. Milk includes other proteins, however.

Both casein and lactalbumin are physiologically complete; that is to say, they contain satisfactory proportions of all the amino acids which the body needs for balanced nutrition. In quality of protein, milk and eggs lead the entire field. And though meats offer a greater proportion of protein by weight than milk, the proteins of milk supply values which other foods cannot offer.

Not only does milk supply excellent proteins, but it also contains lactose, a sugar which has properties not found in other carbohydrates. Lactose encourages an acid reaction in the digestive tract, which diminishes putrefaction and the formation of toxic products which might be absorbed into the blood stream. It also assists in the utilization of calcium and phosphorus.

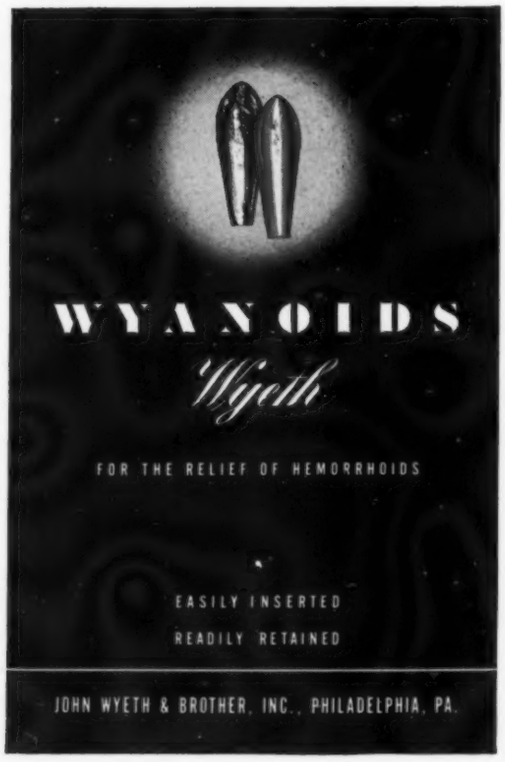
Whole milk is a fine source of fats, too. The fats of milk supply energy, and they also carry such fat soluble vitamins as A and K. The fats which appear in cream help in good body metabolism, as well. "The fats of milk are of superior nutritive value," Hart points out. Not only do they supply vitamin A, but another element which makes whole milk a fine food for the young, the newly discovered fat growth factor. That element appears to be a saturated fatty acid which actually plays the part of a vitamin and is especially important to young animals. The factor has not been isolated nor identified, but it appears to exist only in animal fats. Thus reinforcement of vegetable oils with all the fat soluble vitamins now isolated still leaves those oils inferior as a food for the very young.

Milk fats are almost completely digested and used in the body, and though most fats can claim that same distinction, butterfat has some advantage. Physicians recognize this in their treatment of gall-bladder patients, when they permit the free use of butter and cream, but prohibit other fats.

As a source of caloric energy, milk is very satisfactory. A quart of 4% milk supplies a little less than 700 calories. The daily requirement for an adult varies from 2,500 to 6,000, depending on the season of the year and the energy expended in daily work. Thus milk can help in filling the energy requirements, and may also be employed to help regulate the caloric intake.

Incidentally, milk may be advantageously used in the reducing diet, supplemented by fruit juices, salads, and auxiliary sources of copper, iron, and manganese.

Pasteurization carried on by the newer processes has little effect on the nutritive value of milk. Some earlier



Effective, Convenient and Economical

THE effectiveness of Mercurochrome has been demonstrated by twenty years' extensive clinical use.

For the convenience of physicians Mercurochrome is supplied in four forms—Aqueous Solution for the treatment of wounds, Surgical Solution for preoperative skin disinfection, Tablets and Powder from which solutions of any desired concentration may readily be prepared.

Mercurochrome, H.W.&D.
(dibrom-oxymercuri-fluorescein-sodium)
is economical because solutions may be dispensed at low cost. Stock solutions keep indefinitely.

Mercurochrome is accepted by the Council on Pharmacy and Chemistry of the American Medical Association.

Literature furnished on request

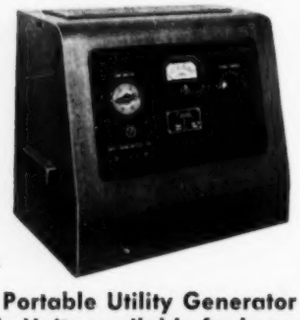
HYNSON, WESTCOTT & DUNNING, INC.
BALTIMORE, MARYLAND

FIRST-AID
★ ★ ★ By Physical Therapy ★ ★ ★

Doctor—Your office can assist in REDUCING TIME LOSSES by installing modern Physical Therapy equipment in the clinic.

LEPEL offers a complete line of — SHORT WAVE DIATHERMIES

Galvanic Sinusoidal Faradic Equipment
★ ★ ★
Infra Red Lamps



Mercury Quartz Ultra Violet Lamps
★ ★ ★
Orificial Quartz Applicators

Portable Utility Generator
Mobile Units available for heavy duty

Write for Details

LEPEL HIGH FREQUENCY LABORATORIES, INC.
39 West 60th Street
NEW YORK, N. Y.

GADOMENT
(PATCH)
TISSUE PAPER DRESSING
IN
BURNS

Applicable to burns of all degrees and sizes, this recently introduced method of using Gadoment (Cod Liver Oil Ointment) is finding favor with physicians.

Extensive burns treated by this method showed

- prompt healing without infection
- minimal scarring
- excellent flexibility of healed skin

as well as a great convenience and simplicity of application.

Send for your copy of the booklet "Common Skin Lesions" and its companion piece—a trial tube of Gadoment.

For the first aid kit: Gadolets—small, convenient gelatin applicators containing Gadoment.

THE E. L. PATCH COMPANY
BOSTON, MASS.

methods partially destroyed the vitamin C and thiamin, but methods are being initiated to retain those vitamins. And even when there are minor losses of those two substances, milk remains an excellent protective and health-promoting food.

In final summary, Hart explains that milk in liberal quantities is a desirable addition to any food plan.

Here's the share of the nutrients an average man requires which can be supplied by a daily quart of milk:

Vitamin A	35 per cent
Vitamin D	10 per cent
Vitamin C	35 per cent
Thiamin	15 per cent
Nicotinic acid	20 per cent
Riboflavin	A full supply
Calcium	More than enough
Phosphorus	65 per cent
Protein	Almost half
Caloric energy	12 to 20 per cent

With that tabulation in mind, it takes no profound rationalization to explain why milk has always held a place as the first food in human diet.

Industrial Health
— *As Related to Licensure* —

C. O. SAPPINGTON, M.D., Dr.P.H.,
Chicago

NEITHER the subject of medical licensure nor the subject of industrial health is new, but the relationship of the one to the other is a fairly recent conception. For this discussion, it seems well to quote from your own publication:

Industrial health is assuming increasing importance is connection with national defense, social ecenomy and other closely related problems. It concerns itself with industrial hygiene, occupational disease and the raising of the standard of health of the employed population. Industrial hygiene has been defined as a system of principles or rules designed for the promotion of the health of our industrial population. It involves not only the specific occupational diseases but all phases of the industrial environment that may have an effect on the health of the worker. The recognition and care of occupational diseases and industrial hazards are coming more and more within the sphere of the practicing physician.

The medicolegal phases of industrial health are likewise presenting new problems of vital interest to the general practitioner. With the marked development of new industries throughout this country and particularly in national defense every effort is being exerted to stimulate the interest of the medical profession in industrial health conservation. It is well to emphasize the further relation to state examining boards, because the principles of industrial hygiene, occupational disease and industrial health come properly within the requirements of medical licensure.

To understand the background for these remarks,* recent developments in the attitude of organized medicine toward industrial health should be noted.

Industrial Health

IN RECOGNITION of the importance of industrial health, the American Medical Association, in 1937, established a Council on Industrial Health. The council has since proved its great value in many activities. Just last month (January 1942) the Fourth Annual Congress on Industrial Health was held under its sponsorship. The program lasted three days, and covered many phases of the subject, including clinical demonstrations and visits to nearby industrial plants. Other activities of the council, too numerous to mention here, have had a salutary effect in emphasizing the importance of participation by the general practitioner in industrial health procedures.

Within the year, the Medical Education Committee of the American Association of Industrial Physicians and Surgeons completed a plan for the study of industrial hygiene and medicine in medical schools, with an outline of courses for undergraduate students. It was formally accepted by the Board of Directors of the American Association of Industrial Physicians and Surgeons, and was sent to the American Medical Association for further consideration. The Association is expected to publish a report of the plan. This is significant in the consideration of our subject, because it presents the opportunity to adopt a standard policy in undergraduate teaching of industrial health subjects.

The Medical Preparedness Committee of the American Medical Association, in an evaluation of the personnel available for industrial uses during the war, disclosed a dearth of

Presented at the Thirty-Eighth Annual Congress on Medical Education and Licensure, Chicago, Feb. 17, 1942.

*The *Federation Bulletin*, October 1941, pp. 289-290.

trained and experienced industrial physicians. Dr. Roscoe G. Leland, Director of the Bureau of Medical Economics of the American Medical Association, presented to the Second Annual Meeting of the American Conference on Industrial Health some interesting figures showing the availability of industrial physicians and surgeons. Of 157,000 physicians who returned questionnaires, 11,300 received schedules asking for specific information concerning their interest or activities in industrial practice. Approximately 7,500 of these 11,300 physicians have returned the special schedules pertaining to industrial practice. Of that number 5,700 have been processed for punch cards and approximately 4,000 have been run through the machines, making the following figures available: 2,967 were engaged in general industrial practice; 677 were engaged in traumatic surgery; 139 were occupied in plant medical department administration; 24 in occupational disease control; 24 in governmental industrial hygiene administration; 49 in workmen's compensation administration; 33 in private industrial hygiene, as private industrial hygiene consultants; 17 in industrial toxicology; 18 in casualty insurance administration; five in industrial hygiene teaching; four in employee health education.

In commenting on these figures, Dr. Leland stated:

> In my opinion, it is not alone necessary that we take care of the health of workers in industry today with the physicians who are competent and who are now available for that purpose. It is in my opinion necessary that the medical profession today prepare and put into operation a program of training in order that in the years to come there may be a continuous new generation of physicians well trained, competent by experience, to take the place of those physicians who, of necessity, must some time pass out of the picture. . . . The recruits for industrial practice, as well as for all other specialties in medicine, must, of necessity, come from the general medical profession, from the practicing physician who yesterday was an intern and was a medical student the day before. These men have had good training. They have had the best training of any physicians that have graduated from our medical schools. They will require, therefore, perhaps a little less of the tedious training for this specialty, but nevertheless they must have some insight into the intricacies, into the hazards, into the new processes, into the new materials, into the environment and the things they will meet in industries, before they can do their best job for the industrial worker. . . . Industrial practice is now in a position of importance and respectability comparable to other specialties in medicine. Extreme care, in my opinion, ought to be taken to keep industrial practice in that high position of respectability. I mention this because we are all aware, I believe, that at one time industrial practice did not have quite this position of respectability. Other specialties are developed from private practitioners, and that is the place where industry must recruit its new generation of specialists.

The specialty of industrial practice will be included in the next *American Medical Directory*. Heretofore, industrial surgery has been listed as a specialty, leaving the medical and the industrial hygiene phases, however, without a category other than public health. This change is indeed encouraging.

Let us briefly consider some of the reasons why a relative minority has been attracted to industrial practice.

1. Lack of a uniform plan for adequate undergraduate instruction in industrial subjects in all recognized medical schools.

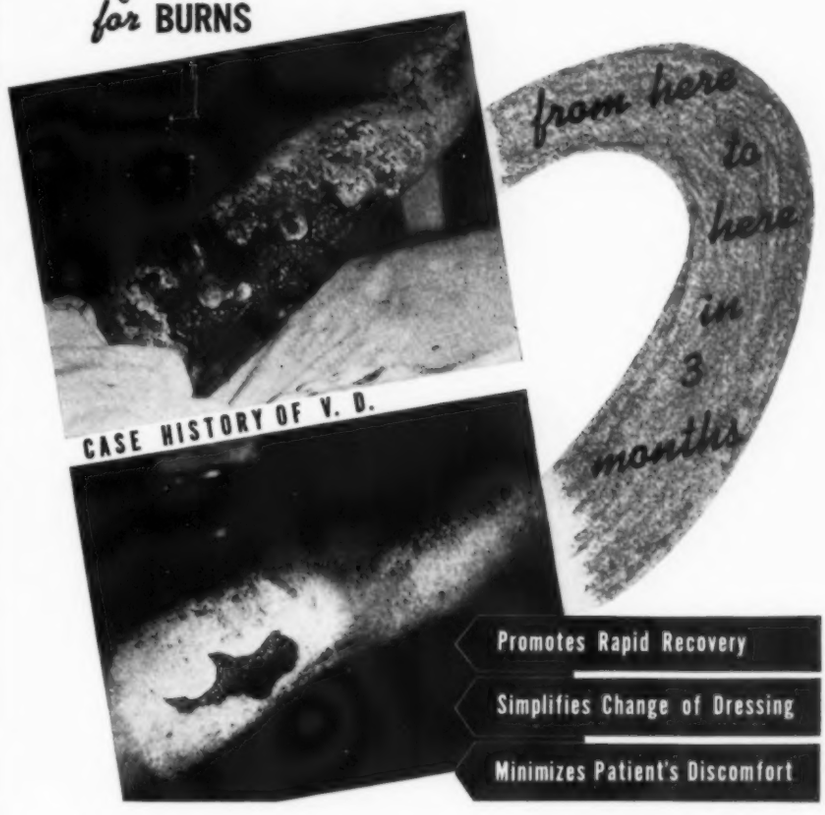
2. Continued abuses in industrial practice, by persons of unrecognized standing, consequent on the absence of official regulation and standards for qualification. Commercial exploitation resulted.

3. The use of supplementary industrial practice as a "stop-gap" or "stepping-stone" until private work reached the desired volume. This hardly improved the already disrespectful attitude of the industrialist, the employe, the insurance company, and the adjudicating bodies in compensation cases.

4. Slow recognition of the need to pass industrial health legislation—a reflection of apathetic public reaction. Even now, only about half of the states have any such provisions.

The investigation of occupational disease claims and the solution of problems of prevention require the

Rigidtest SURGICAL DRESSING for BURNS


CASE HISTORY OF V. D.
from here to here in 3 months
Promotes Rapid Recovery
Simplifies Change of Dressing
Minimizes Patient's Discomfort

Rigidtest SURGICAL DRESSING for local treatment of minor burns, abrasions, lacerations and skin irritations

Composition

Zincborodisalicylate decahydrate with Boric Acid

Zn $B_8C_{56}H_{28}O_{18}(H_2O)_{10}$ (ZINBORSAL)

Vitamins A and D (extract of fish liver oil), Cod Liver Oil, Lecithin, Glycerin, Kaolin, Zinc Oxide and Methyl Parahydroxybenzoate in Lanolin-Petrolatum base.

Excellent results in burn therapy using Rigidtest Surgical Dressing in the case of V. D. were reported as "rapidity of healing, no infection, no abnormal temperature, no discomfort during or following change of dressing." From other medical experience in treatment of burns and industrial injuries with this dressing the following may be anticipated: simplicity of application and change of dressing with minimum discomfort to patient, rapid recovery and return to function. Rigidtest Surgical Dressing with Zinborsal—a new, distinctive complex compound with bactericidal properties, cod liver oil plus Vitamins A and D in Lanolin-Petrolatum base. Supplied in one ounce, three ounce and one pound jars. Professional sample and literature on request.

RIGIDTEST PRODUCTS INC.

318 W. RANDOLPH STREET, CHICAGO, ILLINOIS, U. S. A.

application of industrial hygiene engineering and industrial hygiene chemistry. Some of the difficulties in teaching undergraduates and practicing physicians the fundamentals of industrial hygiene are attributable to that fact. The difficulties, however, are not insurmountable. Although physicians are not expected to become industrial hygiene engineers and industrial hygiene chemists, already a considerable number have become sufficiently well grounded in these technical subjects to give instruction both to undergraduate students and to practitioners in the field. A notable example of the "refresher" type of postgraduate education was conducted during the past year by the Iowa State Department of Health under the direction of Dr. Walter L. Bierring. In nine cities especially selected in the state of Iowa, afternoon and evening meetings were held on industrial health subjects, varying from consideration of wounds and orthopedics, through industrial toxicology, industrial hygiene engineering, the administration of health services in industry, and problems of medicolegal importance. Those who attended and those who participated believe that it was a successful method of bringing to the general practitioner some of the fundamental information on these subjects, instead of expecting him voluntarily to attend meetings held some distance away.

Relationship to Industrial Health

SOME questions relative to industrial hygiene and occupational diseases have been asked in previous state board examinations. In "Medical State Board Examinations," by Dr. Harold Rypins, four pages are devoted to industrial hygiene and allied subjects, including material on lead, phosphorus, arsenic, and mercury poisoning, on tar cancer, and on the effects of benzol, aniline, wood alcohol, carbon monoxide and dusts.

The problem of industrial health and licensure obviously involves medical education, both of undergraduates and practitioners. As desirable as it might be to include questions in state board examinations relative to industrial hygiene and allied subjects, it would be manifestly unfair to do so unless organized instruction had been given to those who are to take the examinations.

Summary

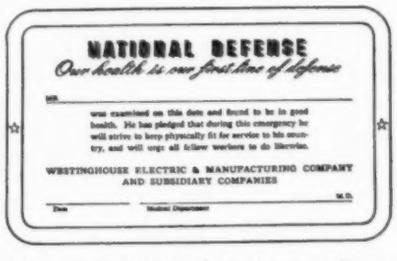
THIS problem has particular interest for those who are concerned with undergraduate and postgraduate education, the administration of examinations by state boards, and groups which have been in the practice of industrial medicine, hygiene and occupational disease. It would, therefore, involve the Federation of State Medical Boards of the United States, the Council on Industrial Health of the American Medical Association, the American Association of Industrial Physicians and Surgeons, and the Council on Medical Education and Hospitals of the American Medical Association.

It is therefore respectfully suggested that due consideration be given to the appointment of a committee on the teaching of industrial health which will include representatives of the above-mentioned bodies. Such a committee could profitably study the problem and make working recommendations to medical schools, examining boards, and qualifying groups.

Discussion

DR. WALTER L. BIERRING, Des Moines, Iowa: Dr. Sappington is one of the leading authorities on industrial medicine and hygiene in this country. He is the editor of INDUSTRIAL MEDICINE, the official publication of the American Association of Industrial Physicians and Surgeons. The need of the hour, that we incorporate in licensing examinations questions regarding industrial hygiene, occupational disease, and industrial health, is the message he has brought us today. To support one man at the front requires five industrial workers. Our job is to keep those industrial workers well. The men who are now beginning to practice are well versed in industrial hazards, and exposures of various kinds. However, their knowledge of occupational disease is imperfect, particularly their knowledge of the non-occupational diseases that cause, perhaps, more absenteeism than industrial injury or disease. As state board examiners we should recognize that industrial hygiene, occupational disease and industrial health are important specialties in the practice of medicine today. Many feel that in days to come the practicing physician will be more concerned with occupational disease than with any other form of medical practice.

WESTINGHOUSE Electric & Manufacturing Company announces free periodic physical examinations available to employees in return for their pledge "to keep physically fit" during the war emergency. DR. C. F. ENGEL, assistant medical director, asks each new employee examined for physical fitness to sign a pledge card before being assigned to work.


NATIONAL DEFENSE

Our health is our first line of defense

Mr. _____

was examined on this date and found to be in good health. He has pledged that during this emergency he will strive to keep physically fit for service to his country, and will urge all fellow workers to do likewise.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY AND SUBSIDIARY COMPANIES

_____ _____ M.D.

Date Medical Department

The card states that the employee was "*examined on this date and found to be in good health. He has pledged that during this emergency he will strive to keep physically fit for service to his country, and will urge all fellow workers to do likewise.*" The same pledge is being signed by veteran workers who voluntarily check up on their health by reporting to the medical department for free physical examinations. For many years Westinghouse has used food to prevent fatigue at its plant in East Pittsburgh and Sharon, where food wagons—cafeterias on wheels—tour the shops mid-morning and mid-afternoon. Fatigue investigations have shown that between-meal snacks, such as milk, sandwiches, candy, help workers build up energy. Another part of the Westinghouse health program is the use of vitamin "A" capsules at the Mansfield Works to overcome eye fatigue. Workers who assemble and inspect tiny mechanisms in military equipment take this vitamin daily. The use of vitamin "A" at Mansfield was begun in 1937 to help color matchers assemble the right shades of parts in electric ranges and refrigerators. The vitamin eliminated not only eye fatigue but also the loss of energy that had bothered some of the workers.

MANUFACTURERS

ELI LILLY and Company, Indianapolis, announce the release of three 16-mm. silent motion pictures in color, descriptive of vitamin deficiency diseases, available to physicians for showing before medical societies and hospital staffs. One deals with thiamine chloride deficiency, one with nicotinic acid deficiency, the third with ariboflavinosis. The major part of each concerns the clinical picture presented by the patient with reference to treatment by diet and specific medication. None contains advertising of any description, nor is the name of Eli Lilly and Company mentioned.

WEST DISINFECTING Company, Long Island City, New York, is distributing without charge, three-color illustrated posters, 9 x 12, suitable for posting in the washrooms of industrial plants to keep the matter of effective washing of hands in the forefront of employee consciousness at all times. A major difficulty facing war industry today is occupational dermatitis. Persuading the average run-of-shop workers to wash as thoroughly as hygienic safety demands is an ever-present problem.

SCHERING Corporation's Medical Research Division has issued "Pelvic Anatomy for the Patient," prepared by DR. ALFRED FINEBERG, medical illustrator, College of Physicians and Surgeons and Presbyterian Hospital, presenting a series of authentic medical drawings illustrating normal and abnormal pelvic anatomy. Copies on request.

LEEDS & NORTHRUP Company offers "Modern Precision," a distinctive publication of general interest to engineers, research scientists, executives and users of electrical instruments, controls and furnaces. It contains news of L&N instruments, controls and heat-treating methods, and of the jobs they are doing in industry, in research laboratories, and in teaching and testing. Copy on request.

1. Patient, white, male, 23 yrs., admitted 2/18/41. Second degree fire burns of face, hands and wrists.

DEEPER BURNS

(Face, Hands, Feet, Joints)

Further Experience in Clinical Practice

with

FOILLE

"Deeper burns, especially those about the hands and flexures, seem to progress more favorably"* when treated with Foille *than when tanned.*

Timely Industrial Considerations

Economy Factor—Cuts down hospital stay through consistently, lower recovery period.

Time Factor—Puts patient back on job sooner.

Rehabilitation—Encourages healing with less contracture — aids in restoring normal function.

". . . Foille appears to be *superior to the tanning method* in the local treatment of burns, and also to have *definite advantages over the cod liver oil therapy.*"

2. Completely healed 3/13/41. Treatment—Foille. Remarkably rapid recovery, very slight, if any, contracture or loss of function. Note how freely hands can be opened and clenched.

FOR THOSE PHYSICIANS WHO ARE SEEING OIL COVERED BURNS: Foille, being a water-in-oil emulsion, exerts a solvent action on light and heavy oils, which may be removed within a few minutes by two or three applications of Foille-saturated dressings.

Write for literature and clinical sample of Foille.

MINE SAFETY APPLIANCES COMPANY
PITTSBURGH

Exclusive Distributors to the First Aid and Industrial Field

*Modern Burn Treatment: Hamilton, J. E., Indus. Med., 10:427-432 (Oct.) 1941.

CARBISULPHOIL COMPANY

3118-22 SWISS AVENUE DALLAS, TEXAS, U. S. A.

CHICAGO NEW YORK LOS ANGELES BIRMINGHAM

NUPERCAINAL*

to the rescue in SUNBURN

NUPERCAINAL, "Ciba" is an efficient Sunburn Defense Warden. It helps extinguish the pain, inflammation and other discomforts of sunburn in double-quick time. Soothing, cooling, healing NUPERCAINAL gives gratifying relief for long hours.

YEAR 'ROUND USE of NUPERCAINAL for speedy mitigation of pain and itching includes conditions such as mild burns, dry eczema, decubitus, intertrigo, fissured nipples, etc. Your pharmacist can supply NUPERCAINAL in one-ounce tubes and from one-pound jars.

TURN IN A CALL FOR LITERATURE.

*Trade Mark Reg. U. S. Pat. Off. Word "Nupercainal" identifies the product as alpha-butyloxycinchoninic acid diethylethylenediamide in lanolin and petrolatum, an ointment of Ciba's manufacture.

NUPERCAINAL

C·I·B·A

CIBA PHARMACEUTICAL PRODUCTS, INC., SUMMIT, NEW JERSEY